THE USE OF MICROCOMPUTERS IN OPHTHALMIC DIAGNOSIS AND MANAGEMENT WITH SPECIAL REFERENCE TO DYSTHYROID EYE DISEASE

Volume 2

BY

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APPENDIX A1 - DOS

MS-DOS stands for Microsoft™ Disc Operating System. Every computer has an operating system which is needed to manage the computer memory, interpret what is keyed in on the keyboard and to operate the display screen. Disk operating systems do all these things and also provide the user with commands and utility programmes to manage the disk files. Though the disk handling routines add a substantial amount to the size of the operating system, parts of DOS are held on disk to be brought in as required, thus saving some space in memory.

A disk operating system therefore provides a wide range of functions for which otherwise each user would have to write his own special routines. This provides a 'standard interface' between the programmer and the computer, and between the computer and the user.

MS-DOS was first produced under the name of PC-DOS for the IBM Personal Computers. MS-DOS and PC-DOS are functionally almost identical, the principal difference being in the implementation within the computer. MS-DOS has rapidly become the standard operating system for 16-bit microcomputers. There are some minor differences in the way certain facilities are implemented on different models.

Most application programmes now being written for microcomputers have, at the very least, an MS-DOS version. Most users now learning to use microcomputers will be learning MS-DOS. The more users that buy MS-DOS, the more programmes will be written. The popularity of a standard is self-generating.

These operating systems are designed for business microcomputers with at least 64K of main memory, one display and keyboard, one or two printers, and one or more disk drives. The drives can be for floppy disk (diskettes) or hard disks. These operating systems are not designed to handle more than one terminal.

Loading MS-DOS: In order order to be able to run, the software must be loaded from disk into the main memory (RAM) of the computer. The main part of the operating system is loaded automatically into memory at the beginning of the

day, when the power is switched on. This is known as 'booting' the operating system, and the 'bootstrap' programme to do this is on the first sector of every disk that contains a copy of MS-DOS. In normal operation the system then remains resident in memory to control each of the user's required applications in turn, as they are loaded, used and set aside. Other programmes are called into memory as and when required, either by the user or by each other.

Reset: The software may also be reloaded at any time by pressing the RESET button. Because a reset will corrupt all the programmes and data currently in the computer, or any files still open on disk, this function is always made difficult to invoke by accident. It may be, for example, a small button at the rear of the computer. The user will need to reset only:

- To change the operating system
- If the system hangs up

Reuse of memory: After use, the application and utility programmes can be overwritten with other programmes. The original copy is kept unchanged on disk or future use. Memory is normally volatile; the contents will be lost if the power is switched off or if there is even a momentary interruption of the mains supply.

In common with all major items of software, the authors of MS-DOS have a policy of active development. This means that new versions of the software will be made available from time to time. The new version may provide more facilities, improve performance or remedy faults. Versions issued purely to remedy faults or to cater for a hardware variation are normally numbered within a version as Version 3.10, 3.21 etc.

MS-DOS commands: MS-DOS user functions are of two types:

- Internal commands permanently resident in memory
- External (utility) command programmes held on disk and called in as required.

Error messages: MS-DOS provides easy-to-understand messages to identify errors that occur. These messages are usually listed in the manuals for further amplification.

Batch commands: Facilities are available in MS-DOS to set up a sequence of commands for automatic execution. Any commands or programme names, with their necessary parameters, may be included in such a sequence. They must be in a file with a .BAT extension. The .BAT sequence file is executed by keying the name of the file; the .BAT extension is not keyed.

Appendix B1 - TEMPRAC interactive screens

.....Press any key to start.....

Enter Hospital Number

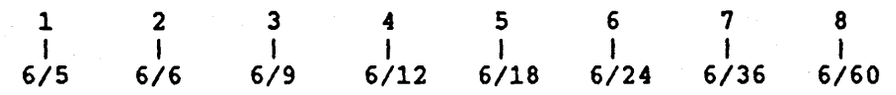
123211

Enter Age Code / 0 for 0 - 9
/ 1 for 10 - 19
/ 2 for 20 - 29
/ 3 for 30 - 39
/ 4 for 40 - 49
/ 5 for 50 - 59
/ 6 for 60 - 69
/ 7 for 70 - 79
/ 8 for 80 - 89
/ 9 for 90 - 99
/ 10 for 100 +

```
  1      2      3      4      5      6      7      8
  |      |      |      |      |      |      |      |
 6/5    6/6    6/9    6/12   6/18   6/24   6/36   6/60
```

Enter Snellen's Visual Acuity (Right Eye)

VAR: 4



Enter Snellen's Visual Acuity (Left Eye)

VAL: 3

Which Eye Would You Like To Test ?

R ... For Right Eye

L ... For Left Eye

T ... To terminate the test

Enter Patient Sex (M/F)

Diagnosis Codes

```
Normal ---------(N)

Amblyopia ------(A)
Cataract -------(C)
                    (C1) -- Congenital
                    (C2) -- Nuclear Sclerosis
                    (C3) -- PSCLO
Diabetes -------(D)
                    (DN) -- No  retinopathy
                    (DB) -- Background; no visible maculopathy
                    (DP) -- Proliferative; no visible maculopathy
                    (DO) -- Macular oedema
                    (DI) -- Ischaemic maculopathy
                    (DE) -- Exudative maculopathy
Glaucoma [OA] --(G)
                    (G0) -- Ocular hypertension
                    (G1) -- Baring of Blind spot
                    (G2) -- Arcuate scotoma
                    (G3) -- Constriction of part of field to <10 deg
                    (G4) -- Constriction of all field to <10 deg
```

Press Any Key

Diagnosis Code (cont.)

```
Hypermetropia --(H)
                    (H1) -- 0-5 DS
                    (H2) -- 6-8 DS
                    (H3) -- 9+  DS
Leber ----------(L)
Myopia ---------(M)
                    (M1) -- 0-5  DS
                    (M2) -- 6-10 DS
                    (M3) -- 11 + DS
Optic N / CNS --(O)  ------- (O+number) referring to card file
Retinitis pig --(R)
SMD ------------(S)
                    (S1) -- Dry
                    (S2) -- Exudative
Thyroid --------(T)
                    (T0) -- Normal nerve function
                    (T1) -- Evidence of optic neuropathy

Unclassified ---(U)
```

Enter Diagnosis Code :

For RIGHT Eye
How would you like to run the test ? (M/A)

M ..... For Manual

A ..... For Automatic

RIGHT Eye will be tested

Size of 8 (6/60), Period of 00.01 SECS

To start push the button S

Test Performed was.. RIGHT Eye, Size 8 (6/60)
For the period of 00.01 SECS
Letter shown was X

Enter :-
S.....if patient answer is correct / and to try a smaller letter

SPACE ...if patient answer is incorrect / and to try a longer time interval

R.....to repeat already performed test

T.....to terminate the automatic runing

```
 LEFT EYE IS TESTED
```

```
enter required size (1 - 8):-

 8       7      6      5      4      3      2     1
 |       |      |      |      |      |      |     |
6/60   6/36   6/24   6/18   6/12   6/9    6/6   6/5
```

```
8
```

```
 LEFT EYE IS TESTED SIZE OF  8 (6/60)
```

```
enter required time period (1 - 20):-

 20..19..18.............10.....................3...2...1
 |                      |                      |
0.95...................0.50.....................0.01 sec
```

```
5
```

```
 LEFT Eye will be tested

 Size of  8 (6/60), Period of  00.20 SECS
```

```
To start push the button S


ALREADY SHOWN LETTER WAS   H
```

```
PLEASE,ENTER WHAT HAS BEEN RECOGNIZED BY THE PATIENT
if a letter ..........................enter it
if nothing  ..................push space button



Test Performed was.. LEFT Eye, Size  8 (6/60)
For the period of 00.20 SECS    WAS   CORRECT
-----------------------------------------------------
DO YOU WANT TO PERFORM ANOTHER TEST (ON THE SAME EYE) ? (Y/N)
```

Appendix B2 - Turbo Pascal & Turbo Graphics Toolbox

Turbo Pascal V 3.0 is a high-performance integrated programming environment. It includes a full-screen, wordStar- like editor. The compiler locates errors, automatically activates the editor and shows the programmer the location of the error in the source code. This provides an environment which improves the productivity of the developers.

Turbo Pascal V 3.0 for the PC-DOS provides window procedures, sound, colour and graphics.

Turbo Graphix toolbox lets developer create high-resolution graphics on the IBM/PC and true compatibles. It provides a set of tools to include in the programmes for complex graphics, windowing and storing screen images to memory. The tools includes the following facilities:

- Drawing simple graphics such as circles, squares, rectangles, and a variety of geometric shapes.
- Procedures for more complex scientific graphics such as bar charts, pie charts, and a variety of curves with optional smoothing.
- Routines for including graphics into flexible windows.
- 'Clipping' option to automatically keep drawings within window boundaries or to 'zoom in' on some aspects of an image.
- Store images in RAM for quick access.

Appendix B3 - TEMPRAC programme listing

```
program VisionAcuity;

{$I typedef.sys} {$I graphix.sys} {$I kernel.sys} {$I windows.sys} {$I axis.hgh} {$I polygon.hgh}

const v60 = 305.00 ; v36 = 508.325 ; v24 = 762.50 ; v18 = 1016.66 ; v12 =
1525.00 ; v9 = 2033.325; v6 = 3050.00 ; v5 = 3660.00 ; h60 = 404.00 ; h36 =
673.33 ; h24 = 1010.00 ; h18 = 1346.66 ; h12 = 2020.00 ; h9 = 2693.33 ; h6 =
4040.00 ; h5 = 4848.00 ;

type s = 1..8 ; r = 1..20 ; regRecord = record ax,bx,cx,dx,bp,di,si,ds,es,flags :integer ;
end; timeString = string[11];

var

LASTNAME :string[8]; FIRSTNAME :string[8]; NUMBER :string[8]; DOB :string[8]; AGE
:string[2] ; SEX :string[1] ; DIAGNOSIS :string[4] ; VA_RT :string[1] ; VA_LT :string[1] ;
OPERATOR :string[8]; DATE :string[8];

whichEye :string[07]; size :s ; visSize :string[09]; resp :r; visResp :string[12]; tas,ts :timestring ;
eye :char; ch :char; letter :string[03]; n,q :integer; c :char; answer :char; acuity :integer;
result :string[12]; MAWZ :text ; printer :text ; DBTRE :text ; DBTRENM :STRING[12]; line
:string[250]; L :integer; {length of Lastname of patient} a :string[250]; t1,t2,time :
timeString ; NrHour,NrMin,NrSec,NrHoSecs :integer ; h1,h2,m1,m2,s1,s2,hs1,hs2 :integer ;
hp,mp,sp,hsp,ht,mt,st,hst :integer ; code :integer ; hh,vv :real ; I :integer ; first :integer ; vbv
:integer ; laster :integer ; RTlast :integer ; LFTlast :integer ; RT,LFT :plotArray; interval :real ;
automatic:boolean ; righting :boolean ; rightering:boolean ; lefting :boolean ; leftering:boolean ; demor
:integer ; getsize :real ; queen :file ; prince :file ;

procedure shifter; begin writeln; writeln; writeln; writeln; writeln; writeln; writeln; end;

procedure copyright; begin shifter;
writeln('*************************************************************************');
writeln('* Copyright (c) April 1987 by *'); writeln('*
*'); writeln('* G. N. Dutton *'); writeln('* A. Wail
M. H. Zeini *'); writeln('* Electronics Department Eye Department *');
writeln('* Strathclyde University Glasgow University *'); writeln('*
*'); writeln('* No part of this Program may be reproduced or distributed in *'); writeln('* any
form or by any means, or stored in database or retrieval system, *'); writeln('* without the prior written
permission of the previous writers. *'); writeln('* *');
writeln('*************************************************************************');
shifter; writeln(' .....Press any key to start..... '); read(kbd,ch); end; procedure showDiag1; begin
writeln; writeln(' Diagnosis Codes ');
writeln('-----------------------------------------------------------');writeln('Normal ---------(N) ');
writeln(' '); writeln('Amblyopia ------(A) '); writeln('Cataract -------(C) '); writeln('
(C1) -- Congenital '); writeln(' (C2) -- Nuclear Sclerosis '); writeln(' (C3)
-- PSCLO '); writeln('Diabetes -------(D) '); writeln(' (DN) -- No
retinopathy '); writeln(' (DB) -- Background; no visible maculopathy '); writeln('
(DP) -- Proliferative; no visible maculopathy '); writeln(' (DO) -- Macular oedema ');
writeln(' (DI) -- Ischaemic maculopathy '); writeln(' (DE) -- Exudative
maculopathy '); writeln('Glaucoma [OA] --(G) '); writeln(' (G0) -- Ocular
hypertension '); writeln(' (G1) -- Baring of Blind spot '); writeln(' (G2) --
Arcuate scotoma '); writeln(' (G3) -- Constriction of part of field to deg'); writeln('
(G4) -- Constriction of all field to deg ');
```

```
writeln('-----------------------------------------------------------------'); writeln('            Press Any Key
'); read(kbd,ch); end;

procedure showDiag2; begin writeln; writeln('            Diagnosis Code (cont.)  ');
writeln('-----------------------------------------------------------------');writeln('Hypermetropia --(H)
'); writeln('          (H1) -- 0-5 DS    '); writeln('          (H2) -- 6-8 DS    '); writeln('
(H3) -- 9+ DS    '); writeln('Leber ----------(L)          '); writeln('Myopia ---------(M)
'); writeln('          (M1) -- 0-5 DS    '); writeln('          (M2) -- 6-10 DS    '); writeln('
(M3) -- 11 + DS   '); writeln('Optic N / CNS --(O) ------- (O+number) referring to card file    ');
writeln('Retinitis pig --(R)          '); writeln('SMD ------------(S)          '); writeln('
(S1) -- Dry      '); writeln('          (S2) -- Exudative  '); writeln('Thyroid --------(T)
'); writeln('          (T0) -- Normal nerve function    '); writeln('          (T1) -- Evidence of
optic neuropathy  '); writeln; writeln('Unclassified ---(U)  ');
writeln('-----------------------------------------------------------------'); writeln; write('    Enter Diagnosis
Code :  '); readln(DIAGNOSIS); end;

begin {MAIN PROGRAM} clrscr; copyright; ClrScr; vbv:=1; automatic:=false; righting:=false;
rightering:=false; lefting:=false; leftering:=false; RTlast:=0; LFTlast:=0;

 shifter; writeln('Enter Hospital Number  '); writeln; readln(NUMBER); ClrScr;

 shifter; writeln('Enter Age Code  / 0  for  0 - 9    '); writeln('          / 1  for 10 - 19   '); writeln('
/ 2  for 20 - 29   '); writeln('          / 3  for 30 - 39   '); writeln('          / 4  for 40 - 49   '); writeln('
/ 5  for 50 - 59   '); writeln('          / 6  for 60 - 69   '); writeln('          / 7  for 70 - 79   '); writeln('
/ 8  for 80 - 89   '); writeln('          / 9  for 90 - 99   '); writeln('          / 10 for 100 +     '); writeln;
writeln; readln(AGE); ClrScr;

 shifter; writeln('Enter Patient Sex (M/F) '); writeln; readln(SEX); ClrScr;

 showDiag1;  clrscr; showDiag2; ClrScr;

 shifter; writeln('  1    2    3    4    5    6    7    8  '); writeln('  |    |    |    |    |    |    |    |  ');
writeln(' 6/5   6/6   6/9   6/12  6/18  6/24  6/36  6/60 '); writeln; writeln; writeln('Enter Snellen''s
Visual Acuity (Right Eye) '); writeln; write('       VAR: '); readln(VA_RT); ClrScr;

 shifter; writeln('  1    2    3    4    5    6    7    8  '); writeln('  |    |    |    |    |    |    |    |  ');
writeln(' 6/5   6/6   6/9   6/12  6/18  6/24  6/36  6/60 '); writeln; writeln; writeln('Enter Snellen''s
Visual Acuity (Left Eye) '); writeln; write('       VAL: '); readln(VA_LT); ClrScr;

 assign(queen,'midest.com'); EXECUTE(queen); end.

program VisionAcuity;

{$I typedef.sys} {$I graphix.sys} {$I kernel.sys} {$I windows.sys} {$I axis.hgh} {$I polygon.hgh}

const v60     = 305.00 ;  v36     = 508.325 ;  v24     = 762.50 ;  v18     = 1016.66 ;  v12     =
1525.00 ;  v9      = 2033.325;  v6      = 3050.00 ;  v5      = 3660.00 ;  h60     = 404.00 ;  h36     =
673.33 ;  h24     = 1010.00 ;  h18     = 1346.66 ;  h12     = 2020.00 ;  h9      = 2693.33 ;  h6      =
4040.00 ;  h5      = 4848.00 ;

 type  s      = 1..8  ;  r      = 1..20 ;  regRecord = record    ax,bx,cx,dx,bp,di,si,ds,es,flags :integer ;
end;  timeString = string[11];
```

```
var

 LASTNAME :string[8]; FIRSTNAME :string[8]; NUMBER  :string[8]; DOB    :string[8]; AGE
:string[2] ; SEX    :string[1] ; DIAGNOSIS :string[4] ; VA_RT   :string[1] ; VA_LT   :string[1] ;
OPERATOR :string[8]; DATE    :string[8];

 whichEye :string[07]; size   :s ; visSize :string[09]; resp   :r; visResp :string[12]; tas,ts  :timestring ;
eye   :char; ch    :char; letter :string[03]; n,q    :integer; c      :char; answer :char; acuity :integer;
result :string[12]; MAWZ   :text ; printer :text ; DBTRE  :text ; DBTRENM :STRING[12]; line
:string[250]; L    :integer;          {length of Lastname of patient} a      :string[250]; t1,t2,time :
timeString ; NrHour,NrMin,NrSec,NrHoSecs :integer ; h1,h2,m1,m2,s1,s2,hs1,hs2  :integer ;
hp,mp,sp,hsp,ht,mt,st,hst  :integer ; code   :integer ; hh,vv  :real  ; I      :integer ; first  :integer ; vbv
:integer ; laster  :integer ; RTlast  :integer ; LFTlast :integer ; RT,LFT  :plotArray; interval :real   ;
automatic:boolean  ; righting :boolean  ; rightering:boolean ; lefting  :boolean  ; leftering:boolean  ; demor
:integer  ; getsize :real   ; queen  :file   ; prince  :file   ;

procedure Letter_A; var dist  : integer  ;

begin if q=1 then copyscreen  else begin

 Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 for  dist:=0 to 68 do Drawline(hh/2-18+dist/2,vv/2-90,hh/2-70+dist/2,vv/2+90); for  dist:=0 to 68
do Drawline(hh/2-18+dist/2,vv/2-90,hh/2+34+dist/2,vv/2+90);
Drawsquare(hh/2-34,vv/2+14,hh/2+34,vv/2+50,true); end; end;

procedure Letter_H ; begin if q=1 then copyscreen   else  begin

 Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 Drawsquare(hh/2-70,vv/2-90,hh/2-34,vv/2+90,true);
Drawsquare(hh/2-34,vv/2-16,hh/2+34,vv/2+16,true);
Drawsquare(hh/2+34,vv/2-90,hh/2+70,vv/2+90,true);  end; end;

procedure Letter_I ;

begin if q=1 then copyscreen    else begin

 Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 Drawsquare(hh/2-18,vv/2-91,hh/2+18,vv/2+91,true); end; end;

procedure Letter_C ;
```

```
 begin if q=1  then copyscreen  else  begin

  Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

  DrawSquare(hh/2-70,vv/2-90,hh/2+70,vv/2-54,true);
Drawsquare(hh/2-70,vv/2-54,hh/2-36,vv/2+54,true);
DrawSquare(hh/2-70,vv/2+54,hh/2+70,vv/2+90,true);  end; end;

procedure Letter_T ; begin if q=1 then  copyscreen  else  begin

  Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

  Drawsquare(hh/2-70,vv/2-90,hh/2+70,vv/2-55,true);
Drawsquare(hh/2-18,vv/2-55,hh/2+18,vv/2+90,true);  end; end;

procedure Letter_X ;

var dist  : integer  ;

begin if q=1 then copyscreen else begin

  Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

for dist :=0  to 36 do Drawline(hh/2-70+dist,vv/2-91,hh/2+34+dist,vv/2+91); for dist :=0  to 36 do
Drawline(hh/2+36+dist,vv/2-91,hh/2-70+dist,vv/2+91); end; end;

procedure Letter_Y ; var  dist   :integer  ; begin if q=1 then copyscreen else begin

  Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 for dist :=0  to  36  do  Drawline(hh/2-70+dist,vv/2-90,hh/2-17+dist,vv/2+19); for dist :=0  to  36  do
Drawline(hh/2+36+dist,vv/2-90,hh/2-19+dist,vv/2+19);
Drawsquare(hh/2-17,vv/2+19,hh/2+17,vv/2+90,true); end; end;

procedure Letter_E ; begin if q=1 then  copyscreen  else  begin

  Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);
```

```
 DrawSquare(hh/2-70,vv/2-90,hh/2+70,vv/2-54,true);
Drawsquare(hh/2-70,vv/2-54,hh/2-36,vv/2+54,true);
DrawSquare(hh/2-70,vv/2+54,hh/2+70,vv/2+90,true);
DrawSquare(hh/2-38,vv/2-18,hh/2+34,vv/2+18,true); end; end;

procedure Letter_V ; var dist : integer ; begin if q=1 then copyscreen else begin

 Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 for dist :=0 to 72 do Drawline(hh/2-70+dist/2,vv/2-90,hh/2-18+dist/2,vv/2+90); for dist :=0 to 72
do Drawline(hh/2+34+dist/2,vv/2-90,hh/2-18+dist/2,vv/2+90); end; end;

procedure Letter_F ; begin if q=1 then copyscreen else begin

 Drawsquare(hh/2-70,vv/2-162,hh/2+70,vv/2-126,true);
Drawsquare(hh/2-70,vv/2+126,hh/2+70,vv/2+162,true);
Drawsquare(hh/2-142,vv/2-90,hh/2-106,vv/2+90,true);
Drawsquare(hh/2+106,vv/2-90,hh/2+142,vv/2+90,true);

 DrawSquare(hh/2-70,vv/2-90,hh/2+70,vv/2-54,true);
Drawsquare(hh/2-70,vv/2-54,hh/2-36,vv/2+90,true);
DrawSquare(hh/2-38,vv/2-18,hh/2+34,vv/2+18,true); end; end;

procedure generator;



function getTime: timeString ; var regs: regRecord; hour ,min ,sec ,hOSecs :string[2]; begin with regs
do begin ax:= $2c shl 8 ; msDos(regs); str(cx shr 8, hour); if length(hour)=1 then hour :=
'0' + hour ; val(hour,NrHour,Code); str(cx mod 256,min); if length(min) =1 then min := '0'
+ min ; val(min,NrMin,code); str(dx shr 8, sec); if length(sec) =1 then sec := '0' + sec ;
val(sec,Nrsec,code); str(dx mod 256,hOSecs); if length(hOSecs) =1 then hOSecs := '0' +hOSecs
; val(hOSecs,NrHoSecs,code); getTime := hour + '-' + min + '-' + sec + '-' + hOSecs ; end; end;

procedure TargetTime; begin

 hst:=hs1+hsp; if hst=100 then begin hst:=hst-100; s1 :=s1+1; end;

 st:=s1+sp; if st=60 then begin st :=st-60; m1 :=m1+1 ; end;

 mt:=m1+mp; if mt=60 then begin mt:=mt-60; h1:=h1+1 ; end;



 ht:=h1+hp; if ht=24 then begin ht:=ht-24; end;



end;
```

```
procedure sizeOfLet; begin ClrScr; writeln(WhichEye,'EYE IS TESTED');
writeln('_____'); writeln; writeln('enter required size
(1 - 8):-      '); writeln; writeln(' 8   7   6   5   4   3   2   1 '); writeln(' |   |   |   |   |   |   |   |
'); writeln('6/60 6/36  6/24 6/18 6/12 6/9  6/6 6/5 ');
writeln('_____'); writeln; readln(size);
writeln('_____'); if ((size8) or (size)) then  begin
sound(4000);  delay(200);  nosound;  sizeOfLet;  end; end;

procedure responce; begin ClrScr;

 case size of  1 : visSize:='1 (6/5) ' ;  2 : visSize:='2 (6/6) ' ;  3 : visSize:='3 (6/9) ' ;  4 : visSize:='4
(6/12)' ;  5 : visSize:='5 (6/18)' ;  6 : visSize:='6 (6/24)' ;  7 : visSize:='7 (6/36)' ;  8 : visSize:='8 (6/60)'
; end;

 writeln(WhichEye,'EYE IS TESTED ','SIZE OF  ' ,visSize);
writeln('_____'); writeln; writeln('enter
required time period (1 - 20):-   '); writeln; writeln(' 20..19..18.....10.....3...2...1      ');
writeln(' |          |          |      '); writeln('0.95.....0.50.....0.01 sec ');
writeln('_____');readln(resp);
writeln('_____'); if ((resp20) or (resp)) then  begin
sound(4000);  delay(40);  nosound;  responce;  end else

 end;

procedure sounding; begin     sound(3000);     delay(100);     nosound;     delay(100);
sound(3000);     delay(100);     nosound;     sound(3000);     delay(100);     nosound;
I:=random(9);     writeln(I);     delay(600);

 case I of   0: begin letter:='F'; c:='f'  end;   1: begin letter:='H'; c:='h'  end;   2: begin letter:='I';
c:='i'  end;   3: begin letter:='C'; c:='c'  end;   4: begin letter:='T'; c:='t'  end;   5: begin letter:='E';
c:='e'  end;   6: begin letter:='A'; c:='a'  end;   7: begin letter:='X'; c:='x'  end;   8: begin letter:='Y';
c:='y'  end;   9: begin letter:='V'; c:='v'  end;  end;

 end;

procedure start; begin ClrScr;

 case size of  1 : visSize:='1 (6/5) ' ;  2 : visSize:='2 (6/6) ' ;  3 : visSize:='3 (6/9) ' ;  4 : visSize:='4
(6/12)' ;  5 : visSize:='5 (6/18)' ;  6 : visSize:='6 (6/24)' ;  7 : visSize:='7 (6/36)' ;  8 : visSize:='8 (6/60)'
; end;

 case resp of

   1 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=01 ;visResp:='00.01 SECS ' ; end;   2 :begin  hp:=00
;mp:=00 ;sp:=00 ;hsp:=05 ;visResp:='00.05 SECS ' ; end;   3 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=10
;visResp:='00.10 SECS ' ; end;   4 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=15 ;visResp:='00.15 SECS ' ;
end;   5 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=20 ;visResp:='00.20 SECS ' ; end;   6 :begin  hp:=00
;mp:=00 ;sp:=00 ;hsp:=25 ;visResp:='00.25 SECS ' ; end;   7 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=30
;visResp:='00.30 SECS ' ; end;   8 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=35 ;visResp:='00.35 SECS ' ;
end;   9 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=40 ;visResp:='00.40 SECS ' ; end;   10 :begin  hp:=00
;mp:=00 ;sp:=00 ;hsp:=45 ;visResp:='00.45 SECS ' ; end;   11 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=50
;visResp:='00.50 SECS ' ; end;   12 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=55 ;visResp:='00.55 SECS ' ;
end;   13 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=60 ;visResp:='00.60 SECS ' ; end;   14 :begin  hp:=00
;mp:=00 ;sp:=00 ;hsp:=65 ;visResp:='00.65 SECS ' ; end;   15 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=70
;visResp:='00.70 SECS ' ; end;   16 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=75 ;visResp:='00.75 SECS ' ;
```

```
end;  17 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=80 ;visResp:='00.80 SECS ' ; end;  18 :begin  hp:=00
;mp:=00 ;sp:=00 ;hsp:=85 ;visResp:='00.85 SECS ' ; end;  19 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=90
;visResp:='00.90 SECS ' ; end;  20 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=95 ;visResp:='00.95 SECS ' ;
end;


  end; writeln; writeln; writeln; writeln; writeln(whichEye,'Eye will be tested '); writeln; writeln(' Size
of ',visSize,', Period of ',visResp );
writeln('_____ '); writeln; writeln('To
start push the button S '); read(Kbd,ch); if((ch='S')or(ch='s')) then sounding else start; end;


procedure prepare; begin selectscreen(2); DrawBorder; DefineWindow(1,4,2,XMaxGlb-4,YMaxGlb-6);
case size of 8 : begin defineWorld(1,0,v60,h60,0); hh:=h60 ;vv:=v60 ;end; 7 : begin
defineWorld(1,0,v36,h36,0); hh:=h36 ;vv:=v36 ;end; 6 : begin defineWorld(1,0,v24,h24,0); hh:=h24
;vv:=v24 ;end; 5 : begin defineWorld(1,0,v18,h18,0); hh:=h18 ;vv:=v18 ;end; 4 : begin
defineWorld(1,0,v12,h12,0); hh:=h12 ;vv:=v12 ;end; 3 : begin defineWorld(1,0,v9 ,h9 ,0); hh:=h9
;vv:=v9  ;end; 2 : begin defineWorld(1,0,v6 ,h6 ,0); hh:=h6  ;vv:=v6  ;end; 1 : begin defineWorld(1,0,v5
,h5 ,0); hh:=h5  ;vv:=v5  ;end; end;


 SelectWorld(1); SelectWindow(1); SetBackground(255); DrawBorder; SetColorblack;


 q:=0; case I of  0: Letter_F ;  1: Letter_H ;  2: Letter_I ;  3: Letter_C ;  4: Letter_T ;  5: Letter_E ;  6:
Letter_A ;  7: Letter_X ;  8: Letter_Y ;  9: Letter_V ; end;


 end;


procedure measure; begin if vbv=1 then  InitGraphic else EnterGraphic; drawborder; vbv:=vbv+1;
prepare; selectscreen(1); DrawBorder; DefineWindow(1,4,2,XMaxGlb-4,YMaxGlb-6); case size of 8 :
begin defineWorld(1,0,v60,h60,0); hh:=h60 ;vv:=v60 ;end; 7 : begin defineWorld(1,0,v36,h36,0);
hh:=h36 ;vv:=v36 ;end; 6 : begin defineWorld(1,0,v24,h24,0); hh:=h24 ;vv:=v24 ;end; 5 : begin
defineWorld(1,0,v18,h18,0); hh:=h18 ;vv:=v18 ;end; 4 : begin defineWorld(1,0,v12,h12,0); hh:=h12
;vv:=v12 ;end; 3 : begin defineWorld(1,0,v9 ,h9 ,0); hh:=h9  ;vv:=v9  ;end; 2 : begin defineWorld(1,0,v6
,h6 ,0); hh:=h6  ;vv:=v6  ;end; 1 : begin defineWorld(1,0,v5 ,h5 ,0); hh:=h5  ;vv:=v5  ;end; end;
SelectWorld(1); SelectWindow(1); SetBackground(255); Drawborder; delay(1000) ;  selectscreen(2)  ;
copyscreen;


if resp1 then begin


 t1 :=getTime  ;ts:=t1; h1 :=NrHour  ; m1 :=NrMin  ; s1 :=NrSec  ; hs1:=NrHoSecs ; targetTime ; n:=1
; q:=1; SetColorBlack;


repeat


 case I of  0: begin  Letter_F ;  end;  1: begin  Letter_H ;  end;  2: begin  Letter_I ;  end;  3: begin
Letter_C ;  end;  4: begin  Letter_T ;  end;  5: begin  Letter_E ;  end;  6: begin  Letter_A ;  end;  7:
begin  Letter_X ;  end;  8: begin  Letter_Y ;  end;  9: begin  Letter_V ;  end; end;


 t1 :=getTime ; h1 :=NrHour  ; m1 :=NrMin  ; s1 :=NrSec  ; hs1:=NrHoSecs; if n=1 then begin  tas:=t1
end; n:=n+1;  q:=q; until ((h1=ht)and((m1=mt) OR (h1ht))and((s1=st) OR (m1mt)) and((hs1=hst) OR
(s1st))) ; {until keypressed;} end;


 t2 :=getTime; selectscreen(1); SelectWorld(1); SelectWindow(1); SetBackground(255); DrawBorder;
delay(500); leaveGraphic; end;
```

```
procedure recording; begin writeln('ALREADY SHOWN LETTER WAS  ',letter);
writeln('_____');writeln;
writeln('PLEASE,ENTER WHAT HAS BEEN RECOGNIZED BY THE PATIENT '); writeln('if a
letter .....enter it  '); writeln('if nothing .....push space button  '); read(kbd,ch);
if ch= ' ' then  begin  result:='UNRECOGNIZED';  end else if ch=c then  begin
result:='CORRECT'  ;  end else  begin  result:='WRONG'  ;  end;

writeln(MAWZ,visSize,'  | ',visResp,'  | ',result);
writeln(MAWZ,'_____');end;



procedure previous; begin clrScr; writeln;writeln; writeln;writeln;

writeln('Test Performed was..',whichEye,'Eye, ','Size  ',visSize ); write('For the period of ',visResp );
end;

procedure manual;

procedure continue; begin write('  WAS  ',result); writeln;
writeln('----------'); writeln('DO YOU WANT TO PERFORM
ANOTHER TEST (ON THE SAME EYE) ? (Y/N) '); read(Kbd,answer); if ((answer='Y') or
(answer='y'))  then manual else if ((answer='N') or (answer= 'n')) then writeln ('O. K. ') else continue;
end;

begin sizeOfLet; responce; start; measure; recording; previous; continue; end;

procedure auto;

procedure update; begin

 case size of  1 : visSize:='1 (6/5) ' ;  2 : visSize:='2 (6/6) ' ;  3 : visSize:='3 (6/9) ' ;  4 : visSize:='4
(6/12)' ;  5 : visSize:='5 (6/18)' ;  6 : visSize:='6 (6/24)' ;  7 : visSize:='7 (6/36)' ;  8 : visSize:='8 (6/60)'
; end;

 case resp of

   1 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=01 ;          visResp:='00.01 SECS ' ; interval:=00.01  end;

   2 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=05 ;          visResp:='00.05 SECS ' ; interval:=00.05  end;

   3 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=10 ;          visResp:='00.10 SECS ' ; interval:=00.10  end;

   4 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=15 ;          visResp:='00.15 SECS ' ; interval:=00.15  end;

   5 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=20 ;          visResp:='00.20 SECS ' ; interval:=00.20  end;

   6 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=25 ;          visResp:='00.25 SECS ' ; interval:=00.25  end;

   7 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=30 ;          visResp:='00.30 SECS ' ; interval:=00.30  end;
```

```
 8 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=35 ;          visResp:='00.35 SECS ' ; interval:=00.35  end;

 9 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=40 ;          visResp:='00.40 SECS ' ; interval:=00.40  end;

10 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=45 ;          visResp:='00.45 SECS ' ; interval:=00.45  end;

11 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=50 ;          visResp:='00.50 SECS ' ; interval:=00.50  end;

12 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=55 ;          visResp:='00.55 SECS ' ; interval:=00.55  end;

13 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=60 ;          visResp:='00.60 SECS ' ; interval:=00.60  end;

14 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=65 ;          visResp:='00.65 SECS ' ; interval:=00.65  end;

15 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=70 ;          visResp:='00.70 SECS ' ; interval:=00.70  end;

16 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=75 ;          visResp:='00.75 SECS ' ; interval:=00.75  end;

17 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=80 ;          visResp:='00.80 SECS ' ; interval:=00.80  end;

18 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=85 ;          visResp:='00.85 SECS ' ; interval:=00.85  end;

19 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=90 ;          visResp:='00.90 SECS ' ; interval:=00.90  end;

20 :begin  hp:=00 ;mp:=00 ;sp:=00 ;hsp:=95 ;          visResp:='00.95 SECS ' ; interval:=00.95  end;

 end;

 case acuity of  1: result:=' UNRECOGNIZED ';  2: result:=' CORRECT ';  3: result:=' WRONG  ';
end; end;

begin

 update; previous; first:=1; writeln; writeln('                    Letter shown was  ',letter);

 writeln('_____________________________________________________________');writeln;
writeln('Enter :- '); writeln('  S.....if patient answer is correct  / and to try a smaller letter'); writeln;
writeln('SPACE ...if patient answer is incorrect / and to try a longer time interval'); writeln; writeln('
R.....to repeat already performed test '); writeln; writeln; writeln('  T.....to terminate the automatic runing
'); read(kbd,ch); clrscr; if ch=' ' then        begin        result:='UNRECOGNIZED';

writeln(MAWZ,visSize,'   | ',visResp,'   | ',result);
writeln(MAWZ,'_____________________________________________________________');

      if resp20 then      begin      resp:=resp+1;      size:=size;      sounding;      measure;
auto;      end;      end else if ch='s' then      begin      result:='CORRECT'  ;

      laster:=laster+1;      if righting then      begin      RT[laster,1]:=interval;
RT[laster,2]:=size;      end;      if lefting  then      begin      LFT[laster,1]:=interval;
LFT[laster,2]:=size;      end;
```

```
writeln(MAWZ,visSize,'  | ',visResp,'  | ',result);
writeln(MAWZ,'_____');

      if size1 then      begin      size:=size-1;      resp:=resp;      sounding;      measure;
auto;      end ;      end else if ch='r' then begin sounding; measure; auto; end

else if ch='t' then      begin      sound(2500);      delay(40);      nosound;      end else auto

end;

procedure manauto; begin clrScr; writeln; writeln; writeln; writeln; writeln('For ',whichEye,' Eye ');
writeln('  How would you like to run the test ? (M/A) '); writeln; writeln('M ..... For Manual  ');
writeln; writeln('A ..... For Automatic ');
writeln('_____'); read(kbd,answer); if
answer='m' then manual else if answer='a'then begin  first:=0;  laster:=0 ;  size:=8 ;  resp:=1 ;
automatic:=true ;  sounding ;  start ;  measure;  auto ; end else begin  sound(4000);  delay(100);
nosound;  manauto;  end; end;

begin manauto; end;

procedure EyeChoice; begin clrScr; if righting then RTlast:=laster; if lefting  then LFTlast:=laster;
writeln; writeln; writeln; writeln; writeln('Which Eye Would You Like To Test ?          '); writeln;
writeln('  R ... For  Right Eye  '); writeln; writeln('  L ... For  Left  Eye  '); writeln; writeln; writeln;
writeln; writeln('  T ... To terminate the test  ');
writeln('----------'); read(kbd,eye); if ((eye='L') OR (eye='l'))
then  begin  whichEye := ' LEFT ';

 lefting:=true;  righting:=false;  leftering:=true;

 writeln(MAWZ,'  '); writeln(MAWZ,'  '); writeln(MAWZ,'          '); writeln(MAWZ,
whichEye, 'EYE  TEST ');
writeln(MAWZ,'==========');
writeln(MAWZ,' SIZE      | PERIOD      | RESULT ');
writeln(MAWZ,'==========');
generator;  EyeChoice;  end else if ((eye ='R') OR (eye='r')) then  begin  whichEye := ' RIGHT ';

 righting:=true;  lefting:=false;  rightering:=true;

 writeln(MAWZ,'  '); writeln(MAWZ,'  '); writeln(MAWZ,'          '); writeln(MAWZ, whichEye,
'EYE  TEST ');
writeln(MAWZ,'==========');
writeln(MAWZ,' SIZE      | PERIOD      | RESULT ');
writeln(MAWZ,'==========');
generator;  EyeChoice;  end else if ((eye ='T') OR (eye='t')) then  begin  clrScr;  writeln;  writeln('TEST
IS TERMINATED ');  end else EyeChoice; end;

Procedure FACER; begin DBTRENM:=(NUMBER+'.txt'); assign(DBTRE,DBTRENM);
rewrite(DBTRE);

write(DBTRE,'"',NUMBER,'",",'AGE,'",",");
write(DBTRE,SEX,'",",'DIAGNOSIS,'",",'VA_RT,'",",'VA_LT,'",',');

if RTlast0 then begin for demor :=1 to RTlast do write(DBTRE,'"',(RT[demor,1]):5:2,'"'); end;
```

```
if RTlast then begin  for demor :=RTlast to 7 do        {7 not 8 to have correct output}
write(DBTRE,'"','-----','"'); end;

if LFTlast0 then begin for demor :=1 to LFTlast do write(DBTRE,'"',(LFT[demor,1]):5:2,'"'); end;

if LFTlast then begin  for demor :=LFTlast to 7 do        {7 not 8}  write(DBTRE,'"','-----','"'); end;

close(DBTRE); end;

begin {MAIN PROGRAM} assign(MAWZ,NUMBER); rewrite(MAWZ); writeln(MAWZ,'
* * * * *              '); writeln(MAWZ,'HOS.NUM.: ',NUMBER); writeln(MAWZ,'  ');
writeln(MAWZ,'AGE CODE: ',AGE,' ':(25-length(AGE)),'SEX : ',SEX); writeln(MAWZ,'  ');
writeln(MAWZ,'DIAGNOSIS CODE : ',DIAGNOSIS); writeln(MAWZ,'  '); writeln(MAWZ,'VAR
CODE : ',VA_RT,' ':(24-length(VA_RT)),'VAL CODE : ',VA_LT); EyeChoice; writeln(MAWZ,'  ');
writeln(MAWZ,'  '); writeln(MAWZ,'  '); writeln(MAWZ,'                    * * * * *    ');
close(MAWZ); FACER; assign(prince,'final.com'); EXECUTE(prince);  end.

program printTest;

{$I typedef.sys} {$I graphix.sys} {$I kernel.sys} {$I windows.sys} {$I axis.hgh} {$I polygon.hgh}

 const  v60      = 305.00 ;  v36      = 508.325 ;  v24      = 762.50 ;  v18      = 1016.66 ;  v12      =
1525.00 ;  v9       = 2033.325;  v6       = 3050.00 ;  v5       = 3660.00 ;  h60      = 404.00 ;  h36      =
673.33 ;  h24      = 1010.00 ;  h18      = 1346.66 ;  h12      = 2020.00 ;  h9       = 2693.33 ;  h6       =
4040.00 ;  h5       = 4848.00 ;

 type  s       = 1..8  ;  r       = 1..20 ;  regRecord = record    ax,bx,cx,dx,bp,di,si,ds,es,flags :integer ;
end;  timeString = string[11];

 var

 LASTNAME  :string[8]; FIRSTNAME :string[8]; NUMBER   :string[8] ;  DOB      :string[8]; AGE
:string[2] ;  SEX      :string[1] ;  DIAGNOSIS :string[4] ;  VA_RT    :string[1] ;  VA_LT    :string[1] ;
OPERATOR  :string[8]; DATE     :string[8];

 whichEye :string[07]; size    :s ;  visSize  :string[09]; resp    :r;  visResp  :string[12]; tas,ts   :timestring ;
eye    :char;  ch     :char;  letter  :string[03]; n,q     :integer;  c       :char;  answer  :char;  acuity  :integer;
result  :string[12]; MAWZ    :text ;  printer  :text ;  DBTRE    :text ;  DBTRENM  :STRING[12]; line
:string[250]; L      :integer;          {length of Lastname of patient} a       :string[250]; t1,t2,time  :
timeString ;  NrHour,NrMin,NrSec,NrHoSecs  :integer ;  h1,h2,m1,m2,s1,s2,hs1,hs2   :integer ;
hp,mp,sp,hsp,ht,mt,st,hst   :integer ;  code    :integer ;  hh,vv   :real   ;  I       :integer ;  first   :integer ;  vbv
:integer ;  laster   :integer ;  RTlast   :integer ;  LFTlast  :integer ;  RT,LFT   :plotArray;  interval :real    ;
automatic:boolean  ;  righting :boolean  ;  rightering:boolean ;  lefting  :boolean  ;  leftering:boolean  ;  demor
:integer  ;  getsize  :real    ;  queen    :file    ;  prince   :file    ;

procedure polydem; begin

setColorwhite; setBackground(0);

gotoxy(1,1); writeln('Hospital No. ',NUMBER,' ',SEX,'  Age Code ',AGE,'  Diag. Code
',DIAGNOSIS);

if rightering then begin
```

```
if RTlast2 then begin

defineWindow(1,0,10 * Ymaxglb div 100, Xmaxglb ,55 * Ymaxglb div 100);
defineWorld(1,0,9.999,1.08,0); selectWorld(1); selectWindow(1); DrawAxis(9,-8,0,0,25,0,0,0,true);
Drawpolygon(RT,1,RTlast,2,2,0);

end else begin      gotoxy(4,7);      writeln(' curve is not drawn if points less than 3 ');      end;

for demor:=1 to RTlast do begin  interval:=RT[demor,1];  getsize:=RT[demor,2];

  size:=trunc(getsize);

 case size of  1 : visSize:='1 (6/5) ' ;  2 : visSize:='2 (6/6) ' ;  3 : visSize:='3 (6/9) ' ;  4 : visSize:='4
(6/12)' ;  5 : visSize:='5 (6/18)' ;  6 : visSize:='6 (6/24)' ;  7 : visSize:='7 (6/36)' ;  8 : visSize:='8 (6/60)'
; end;

 case demor of  1  : begin      gotoxy(58,3);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  2  : begin      gotoxy(43,4);      write(' RIGHT EYE ');      gotoxy(58,4);      writeln(visSize,'
...',interval:5:2,' SECS ');      end;

  3  : begin      gotoxy(58,6);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  4  : begin      gotoxy(58,7);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  5  : begin      gotoxy(58,9);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  6  : begin      gotoxy(58,10);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  7  : begin      gotoxy(58,12);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  8  : begin      gotoxy(58,13);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

 end; end; end;

gotoxy(56,14); writeln('.....');

if leftering then begin

if LFTlast2 then begin

defineWindow(2,0,55 * Ymaxglb div 100, Xmaxglb , Ymaxglb ); defineWorld(2,0,9.999,1.08,0);
selectWorld(2); selectWindow(2); DrawAxis(9,-8,0,0,25,0,0,0,true); Drawpolygon(LFT,1,LFTlast,2,2,0);

end else begin      gotoxy(4,19);      writeln(' curve is not drawn if points less than 3 ');      end;

for demor:=1 to LFTlast do begin  interval:=LFT[demor,1];  getsize:=LFT[demor,2];

  size:=trunc(getsize);
```

```
 case size of  1 : visSize:='1 (6/5) ' ;  2 : visSize:='2 (6/6) ' ;  3 : visSize:='3 (6/9) ' ;  4 : visSize:='4
(6/12)' ;  5 : visSize:='5 (6/18)' ;  6 : visSize:='6 (6/24)' ;  7 : visSize:='7 (6/36)' ;  8 : visSize:='8 (6/60)'
; end;

 case demor of  1 : begin      gotoxy(58,15);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  2 : begin      gotoxy(43,16);      write(' LEFT EYE ');      gotoxy(58,16);      writeln(visSize,'
...',interval:5:2,' SECS ');      end;

  3 : begin      gotoxy(58,18);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  4 : begin      gotoxy(58,19);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  5 : begin      gotoxy(58,21);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  6 : begin      gotoxy(58,22);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  7 : begin      gotoxy(58,24);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

  8 : begin      gotoxy(58,25);      writeln(visSize,' ...',interval:5:2,' SECS ');      end;

 end; end; end;

end;

procedure DMSTR; begin

 clrScr; writeln; writeln; writeln; writeln; writeln('Do you want to draw the test results ? (Y/N)');
read(Kbd,answer); case answer of     'Y','y'  : begin          entergraphic;          polydem;
repeat until keypressed;          leavegraphic;          end;     'N','n'  :writeln('O.K. '); else begin
sound(4000);     delay(200);     nosound;     DMSTR;     end; end; end;

 procedure print;

 begin clrScr; writeln; writeln; writeln; writeln; writeln('Do you want to print the test results ? (Y/N)');
read(Kbd,answer); case answer of     'Y','y'  : begin          reset(MAWZ);
assign(printer,'PRN');          rewrite(printer);          clrScr;          writeln('THE TEST IS
PRINTED');          while not eof(MAWZ) do          begin          readln(MAWZ,a);
writeln(printer,a);          end;          close(MAWZ);          close(printer);          end;
'N','n'  : writeln('O.K.');

 else begin     sound(4000);     delay(200);     nosound;     print;     end;  end; end;

 begin

if automatic then DMSTR; print;

end.
```

Appendix B4 - Automatic Chart Reader programme listing

```
#include _____.h #include alloc.h #include .h

int x_index[11][84] = { {50,53,56,59,62,65,68,71,74,77,80,83,86,89,92,95,98,101,
104,107,110,113,116,119,122,125,128,131,134,137,140,143,146,149,152,155,
158,161,164,167,170,173,176,179,182,185,188,191,194,197,200,203,206,209,
212,215,218,221,224,227,230,233,236,239,242,245,248,251,254,257,260,263,
266,269,272,275,278,281,284,287,290,293,296,299},
{50,53,56,59,62,65,68,71,74,77,80,83,86,89,92,95,98,101,
104,107,110,113,116,119,122,125,128,131,134,137,140,143,146,149,152,155,
158,161,164,167,170,173,176,179,182,185,188,191,194,197,200,203,205,208,
211,214,217,220,223,226,229,232,235,238,241,244,247,250,253,256,259,262,
265,268,271,274,277,280,283,286,289,292,295,298},
{50,53,56,59,62,65,68,71,74,77,80,83,86,89,91,94,97,100,
103,106,109,112,115,118,121,124,127,130,133,136,139,142,145,148,151,154,
157,160,163,166,169,172,175,178,181,184,187,190,193,196,199,202,205,208,
211,214,217,220,223,226,229,232,235,238,241,244,247,250,253,256,259,262,
265,268,271,273,276,279,282,285,288,291,294,297},
{50,52,55,58,61,64,67,70,73,76,79,82,85,88,91,94,97,100,
103,106,109,112,115,118,121,124,127,130,133,136,139,142,145,148,151,153,
156,159,162,165,168,171,174,177,180,183,186,189,192,195,198,201,204,207,
210,213,216,219,222,225,228,231,234,237,240,243,246,249,252,254,257,260,
263,266,269,272,275,278,281,284,287,290,293,296},
{49,52,55,58,61,64,67,70,73,76,79,82,85,88,91,94,97,99,
102,105,108,111,114,117,120,123,126,129,132,135,138,141,144,147,150,153,
156,159,162,164,167,170,173,176,179,182,185,188,191,194,197,200,203,206,
209,212,215,218,221,224,227,229,232,235,238,241,244,247,250,253,256,259,
262,265,268,271,274,277,280,283,286,289,292,294},
{49,52,55,58,61,64,67,69,72,75,78,81,84,87,90,93,96,99,
102,105,108,111,113,116,119,122,125,128,131,134,137,140,143,146,149,152,
155,157,160,163,166,169,172,175,178,181,184,187,190,193,196,199,201,204,
207,210,213,216,219,222,225,228,231,234,237,240,243,246,248,251,254,257,
260,263,266,269,272,275,278,281,284,287,290,292},
{49,51,54,57,60,63,66,69,72,75,78,81,83,86,89,92,95,98,
101,104,107,110,113,115,118,121,124,127,130,133,136,139,142,145,147,150,
153,156,159,162,165,168,171,174,177,180,182,185,188,191,194,197,200,203,
206,209,212,214,217,220,223,226,229,232,235,238,241,244,246,249,252,255,
258,261,264,267,270,273,276,278,281,284,287,290},
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100,103,106,109,112,114,117,120,123,126,129,132,135,137,140,143,146,149,
152,155,158,161,163,166,169,172,175,178,181,184,186,189,192,195,198,201,
204,207,210,212,215,218,221,224,227,230,233,236,238,241,244,247,250,253,
256,259,261,264,267,270,273,276,279,282,285,287},
{48,50,53,56,59,62,65,68,70,73,76,79,82,85,87,90,93,96,
99,102,105,107,110,113,116,119,122,125,127,130,133,136,139,142,145,147,
150,153,156,159,162,165,167,170,173,176,179,182,185,187,190,193,196,199,
202,204,207,210,213,216,219,222,224,227,230,233,236,239,242,244,247,250,
253,256,259,262,264,267,270,273,276,279,282,284},
{47,50,53,55,58,61,64,67,70,72,75,78,81,84,86,89,92,95,
98,101,103,106,109,112,115,117,120,123,126,129,132,134,137,140,143,146,
148,151,154,157,160,163,165,168,171,174,177,179,182,185,188,191,194,196,
199,202,205,208,210,213,216,219,222,225,227,230,233,236,239,242,244,247,
250,253,256,258,261,264,267,270,273,275,278,281},
{46,49,52,55,57,60,63,66,69,71,74,77,80,83,85,88,91,94,
96,99,102,105,108,110,113,116,119,121,124,127,130,133,135,138,141,144,
146,149,152,155,158,160,163,166,169,172,174,177,180,183,185,188,191,194,
197,199,202,205,208,210,213,216,219,222,224,227,230,233,236,238,241,244,
247,249,252,255,258,261,263,266,269,272,274,277}, }; int y_index[11][84] = {
```

{349,349,349,349,349,349,349,349,348,348,348,348,348,348,348,348,348,347,
347,347,347,347,347,347,347,347,347,346,346,346,346,346,346,346,346,346,
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319,318,318,318,317,316,315,315,314,314,314,313,312,311,311,310,309,309,
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298,297,296,295,295,295,294,294,293,292,291,291},
{339,338,338,337,337,336,335,334,334,333,332,332,331,330,330,329,328,328,
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314,314,314,313,312,311,310,310,309,309,308,307,307,306,305,305,304,303,
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310,309,309,308,307,307,306,305,305,304,303,302,301,300,300,299,298,297,
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276,275,274,273,273,272,271,270,269,268,268,267},
{335,334,333,332,332,331,330,328,328,327,326,325,324,323,323,321,320,319,
318,318,317,316,315,314,313,312,311,310,309,309,308,306,305,305,304,303,
302,301,300,299,298,297,296,295,295,294,293,291,291,290,289,288,287,286,
286,284,283,282,282,281,280,279,278,277,276,275,274,273,273,272,271,269,
268,268,267,266,265,264,263,262,261,260,259,259},};

main() { int m, r = 60, f = 30 , x = 320, y = 200; static char monitor[] = "HALOIBME.DEV"; static char scanner[] = "HALOCANN.SCN"; static int scan1[18] = {-1,3710,-1,2250,-1,-1,-1,1,0,-1,-1,-1,-1,-1,-1,-1,-1}; static char photo[] = {"try4.pic"}; static char phout[] = {"try5.pic"}; int mode = 5; int maxcolor; int index = 9; int c, a, b, g, h; int n; int x_centre, y_centre; int hold[639]; int z; int col; int o,p; int shift ; int

```
q,w ; int xx,yy,c_up,c_down; int black = 0; int white = 15; int x1_rel, y1_rel, x2_rel, y2_rel; int qq,ff;
float a1, a2; /**********************************************************/ int x1 = 100; int y1 = 100;
int x2 = 300; int y2 = 300; int delta_x, delta_y, bytes, buffer_size; unsigned char s_array[40006]; int
*intptr,s;/**********************************************************/ int x3 = 0, y3=450 ; int md
=4;/**********************************************************/ int r_index,a_index; int
x_adjust,y_adjust; int curve_qt,c_check; int pilot; int curve_temp[6][3]={ {0,0,0}, {0,0,0}, {0,0,0},
{0,0,0}, {0,0,0}, {0,0,0} }; int pre_filled = 0; int pre_flag; int pre_pilot, pre_p ; int pre_ray[6][3]={
{0,0,600}, {0,0,600}, {0,0,600}, {0,0,600}, {0,0,600}, {0,0,600} }; int curr_filled = 0; int curr_flag; int
curr_pilot ,curr_p; int curr_ray[6][3]={ {0,0,600}, {0,0,600}, {0,0,600}, {0,0,600}, {0,0,600}, {0,0,600}
}; int next_filled = 0; int next_flag; int next_pilot, next_p; int next_ray[6][3]={ {0,0,600}, {0,0,600},
{0,0,600}, {0,0,600}, {0,0,600}, {0,0,600} }; int observer; int compare_ray[18][7]; int compare_pilot; int
pre_diff,next_diff; int tolerance = 23; /********** allowed tolerance between curve points ***/ int
next_point; int curve_keep[30][6]; int total_qt; int actual_cur_qt; int user_qt = 3; int row; int temp_place;
int logic = 0; int first,second,third; int compare_curr; int keep_or_not; int xarray[10],yarray[10];
/**********************************************************/setdev(monitor);
initgraphics(&mode); /* setscan(scanner); setscattr(scan1); gscan(); gwrite(photo); */ gread(photo);


flood(&index); movabs(&x,&y); inqclr (&x, &y, &index); c = index; while (c != 9) { inqclr (&x, &y,
&c); x--; } movabs(&x,&y); /* cir(&f);*/ a = x; x = 320; movabs(&x,&y); /*cir(&f);*/ c = 3; while (c !=
9) { inqclr (&x, &y, &c); x++; } movabs(&x,&y); /*cir(&f);*/ b = x; movabs(&a, &y); index = 6 ;
setcolor(&index); x = b; y = 200; lnabs (&x, &y) ; /*cir(&r);*/ x = ((a + b)/2) + 1 ; x_centre = x;
movabs(&x,&y); /*cir(&r);*/ c = 3; while (c != 9) { inqclr (&x, &y, &c); y--; } g = y; movabs(&x,&g);
/*cir(&r);*/ y++;y++;       /* WHY ? ???????????? */ movabs(&x,&y); c = 3; while (c != 9) { inqclr (&x,
&y, &c); y++; } h = y; movabs(&x,&h); /*cir(&r);*/ setcolor(&index); lnabs(&x,&g); y = (g + h)/2 ;
y_centre = y; x = x_centre; movabs(&x,&y); /*cir(&r);*/ c = 3; while (c != 9) { inqclr (&x, &y, &c); x--;
} movabs(&x,&y); /*cir(&f);*/ o = x; p = x + 2 * (x_centre - o); x = p ; lnabs(&x,&y);
box(&o,&g,&p,&h); n = 450; scroll(&n); delta_y = (h - g)/2 ; delta_x = (p - o)/2 ; shift = 20; q = h + shift
; w = q + delta_y; index = 0; setcolor(&index); bar(&o,&q,&p,&w);
/**********************************************************************/ x1 = x_centre -
200; y1 = y_centre - 200;


x2 = x_centre; y2 = y_centre;


movefrom(&x1, &y1, &x2, &y2, s_array);


x3 = x_centre - 200; y3 = (h + 20 + ((h - g)/2) ) - 200;


for(qq=y3-1 ; qq (y3+1); ++qq){   for(ff=x3-1; ff (x3+2); ++ff) {   moveto(&ff ,&qq ,s_array ,&md);   }
} /**********************************************************************/ x1 = o; y1 = g;
x2 = x_centre - 200; y2 = y_centre - 200; movefrom(&x1, &y1, &x2, &y2, s_array); x3 = o; y3 = q;


for(qq=y3-1 ; qq (y3+1); ++qq){   for(ff=x3-1; ff (x3+2); ++ff) {   moveto(&ff ,&qq ,s_array ,&md);   }
} /**********************************************************************/ x1 = x_centre
- 200; y1 = g; x2 = x_centre; y2 = y_centre - 200; movefrom(&x1, &y1, &x2, &y2, s_array);


x3 = x_centre - 200; y3 = q;


for(qq=y3-1 ; qq (y3+1); ++qq){   for(ff=x3-1; ff (x3+2); ++ff) {   moveto(&ff ,&qq ,s_array ,&md);   }
} /**********************************************************************/ x1 = o; y1 =
y_centre - 200; x2 = x_centre - 200; y2 = y_centre; movefrom(&x1, &y1, &x2, &y2, s_array); x3 = o; y3
= w - 200; for(qq=y3-1 ; qq (y3+1); ++qq){   for(ff=x3-1; ff (x3+2); ++ff) {   moveto(&ff ,&qq ,s_array
,&md);   } }
/**********************************************************************/ n = - 300;
scroll(&n); index = 6; setcolor(&index); for (vv = 0; vv  delta_y; ++vv){   for (xx = 0; xx  delta_x;
++xx){          x1_rel = x_centre + xx;          y1_rel = y_centre + vv; x2_rel = x_centre - xx;       y2_rel =
```

```
                inqclr(&x1_rel, &y1_rel , &c_up);  inqclr(&x2_rel, &y2_rel , &c_down);
else */         if ( (c_up == white) & (c_down == white) )          ptabs(&x1_rel,&y1_rel);

                /* else if c_up = white and c_down = black  leave it */   } }

/* n = -450; scroll(&n);*/ /* gwrite(phout); */ r_index = 0; a_index = 0; index = 9; setcolor(&index);
/********************** new *********/ mono(); next_point = 0; observer = 1; for (a_index = 0;
a_index 10; a_index++){ curve_qt = 0; r_index = 0; c_check = 0;  while ( (r_index 83) && (curve_qt 5)
) {   x_adjust = (x_index[a_index][r_index]) + x_centre ;   y_adjust = y_centre - (
(y_index[a_index][r_index]) - 350);


  inqclr(&x_adjust,&y_adjust,&c_check); /*printf("c_check = %d write c_check, r_index =
%d\n",c_check,(50 + (3 * r_index)));*/ /*                  c_check = (getch() - 48) ;*/   if ( (c_check =
83) ) {          ptabs(&x_adjust,&y_adjust);       curve_temp[curve_qt][0]= x_adjust;          curve_te
y_adjust;        curve_temp[curve_qt][2]= (50 +(3 * r_index));       curve_qt++;  while ( (c_check == 15) &&
(r_index 83) ){                  r_index++;                  x_adjust = (x_index[a_index][r_index]) + x
(y_index[a_index][r_index]) - 350); /*                  printf("write c_check, r_index = %d\n",(50 +
/*                  c_check = (getch() - 48 );*/       inqclr(&x_adjust,&y_adjust,&c_check);
r_index++; /*  printf("r_index = %d\n",r_index);*/  }/* while */


/*printf("curve_qt = %d\n",curve_qt);          for (pilot = 0; pilot (curve_qt - 1); pilot++ ){ printf("curve_tem
x= %d,y =%d,r =%d\n",curve_temp[pilot][0],curve_temp[pilot][1],     curve_temp[pilot][2]);          }*/


if ( (pre_filled != 1) && ( observer== 1 ) ){          for (pilot = 0; pilot (curve_qt - 1) ; pilot++ ){
pre_rav[pilot][0] = curve_temp[pilot][0];          pre_rav[pilot][1] = curve_temp[pilot][1];
pre_rav[pilot][2] = curve_temp[pilot][2];          }/* for */          pre_filled = 1;    pre_pilot = curve_qt;


/*printf("pre_pilot = %d\n",pre_pilot);          for (pilot = 0; pilot (pre_pilot - 1); pilot++ ){ printf("pre_rav x
%d,y = %d,r =  %d \n",pre_rav[pilot][0],pre_rav[pilot][1],          pre_rav[pilot][2]);          } */ }/*


if ( (curr_filled != 1) && ( observer== 2 ) ){          for (pilot = 0; pilot (curve_qt - 1); pilot++ ){
curr_rav[pilot][0] = curve_temp[pilot][0];          curr_rav[pilot][1] = curve_temp[pilot][1];
curr_rav[pilot][2] = curve_temp[pilot][2];          }/* for */          curr_filled = 1;          curr_


/*printf("curr_pilot = %d\n",curr_pilot);          for (pilot = 0; pilot (curr_pilot - 1); pilot++ ){ printf("curr_rav
= %d,y = %d,r =  %d \n",curr_rav[pilot][0],          curr_rav[pilot][1],curr_rav[pilot][2]);          } */ }/*


if ( (next_filled != 1) && ( observer== 3 ) ){          for (pilot = 0; pilot (curve_qt - 1); pilot++ ){
next_rav[pilot][0] = curve_temp[pilot][0];          next_rav[pilot][1] = curve_temp[pilot][1];
next_rav[pilot][2] = curve_temp[pilot][2];          }/* for */          next_filled = 1;          next_


/*printf("next_pilot = %d\n",next_pilot); for (pilot = 0; pilot (next_pilot - 1); pilot++ ){ printf("next_rav
x = %d,y = %d,r =  %d \n",next_rav[pilot][0],          next_rav[pilot][1],next_rav[pilot][2]);          }*/


}/* if */          /******/          /*****************/ /*printf("pre_filled = %d , curr- =%d
= %d \n",pre_filled,curr_filled,          next_filled);*/


if ( (pre_filled == 1) && (curr_filled == 1) && (next_filled == 1) ){ total_qt = pre_pilot + curr_pilot +
next_pilot;


for (col = 0; col 17; col++){   for (row = 0; row 6; row++){     compare_rav[col][row] = 0;   } }


/*printf("total_qt = %d, I am in the sorting loop\n ",total_qt);*/
```

```
compare_pilot = 0;

pre_p = 0; curr_p = 0; next_p = 0;

while (compare_pilot (total_qt - 1) ){

first = pre_ray[pre_p][2]; second = curr_ray[curr_p][2]; third = next_ray[next_p][2];

if (pre_p == (pre_pilot ))     first = 600; /* dummy */ if (curr_p == (curr_pilot))     second = 600; /*
dummy */ if (next_p == (next_pilot))     third = 600; /* dummy */    if ( first second ) { temp_place =
first;              pre_flag = 1;     curr_flag = 0;     next_flag = 0;     logic = 1;     }     else if (first second) {
second;             pre_flag = 0;     curr_flag = 1;     next_flag = 0;     logic = 1; }
/*printf("pre_ray[%d][2]=%d,curr_ray[%d][2] =%d, temp_place =%d\n ",pre_p,
first,curr_p,second,temp_place);*/

if ( (third temp_place) && (logic == 1) ) {     temp_place = third;     pre_flag = 0;     curr_flag = 0;
next_flag = 1;     } /*printf("---- next_ray[%d][2]=%d, temp_place =%d \n", next_p,third,temp_place);*/

/*printf("pre_flag = %d, curr_flag = %d, next_flag = %d\n",pre_flag,curr_flag,   next_flag);*/
/**********************************/

    compare_ray[compare_pilot][0] = temp_place; /* r value */     if ( (pre_flag == 1) && (pre_p
(pre_pilot )) ){     ++pre_p;     }

    if ((curr_flag == 1) ) {          compare_ray[compare_pilot][1] = 1; compare_ray[compare_pilot][5] =
curr_ray[curr_p][0]; /*x value*/     compare_ray[compare_pilot][6] = curr_ray[curr_p][1]; /*y value*/

    if  (curr_p  (curr_pilot ))          ++curr_p;     }

    if ( (next_flag == 1) &&  (next_p  (next_pilot )) ) {                    ++next_p;     }

logic = 0; pre_flag = 0; curr_flag = 0; next_flag = 0; ++compare_pilot; } /*for (pilot = 0; pilot (total_qt
-1); ++pilot ){ printf("compare_ray
[0]=%d,[1]=%d,[2]=%d,[3]=%d",compare_ray[pilot][0],compare_ray[pilot][1],compare_ray[pilot][2],
                compare_ray[pilot][3]); printf(",[4]=%d,[5]=%d,[6]=%d\n",compare_ray[pilot][4],
                compare_ray[pilot][5],compare_ray[pilot][6]);          }*/
/*************************************************************************/*********
**********          **********/ compare_pilot = 0; for (compare_pilot = 0; compare_pilot (total_qt -
1) ; ++compare_pilot) {

compare_curr = compare_ray[compare_pilot][1];

if (compare_curr == 1){

   if (compare_pilot  0){ pre_diff = compare_ray[compare_pilot][0] - compare_ray[compare_pilot-1][0];
if (pre_diff  0) (pre_diff = - pre_diff); compare_ray[compare_pilot][2] = pre_diff;    }

   if (compare_pilot  (total_qt - 1)){ next_diff = compare_ray[compare_pilot][0] -
compare_ray[compare_pilot+1][0]; if (next_diff  0) (next_diff = - next_diff);
compare_ray[compare_pilot][3] = next_diff;                                    }      } } /* for */ /*printf("\n,\n,\n,\n");
printf("********difference********\n,\n,\n");
```

```
for (pilot = 0; pilot (total_qt - 1); pilot++ ){ printf("compare_ray
[0]=%d,[1]=%d,[2]=%d,[3]=%d",compare_ray[pilot][0],compare_ray[pilot][1],compare_ray[pilot][2],
                compare_ray[pilot][3]);printf(",[4]=%d,[5]=%d,[6]=%d\n",compare_ray[pilot][4],
                compare_ray[pilot][5],compare_ray[pilot][6]);          }*/
/*****************************************/*printf("\n,\n,\n,\n,\n,****** CHECK
TOLERANCE**************\n\n\n\n");*/compare_pilot = 0; for (compare_pilot = 0; compare_pilot
(total_qt - 1) ; ++compare_pilot) { compare_curr = compare_ray[compare_pilot][1];


 if (compare_curr == 1){


   if (compare_pilot == 0){          if (compare_ray[compare_pilot][2] tolerance)    /* 5 pixel */
(compare_ray[compare_pilot][4] = 1) ;                                    }


   if ( (compare_pilot 0) && (compare_pilot total_qt) ) {                  if ( (compare_ray[compare_pilot][2],
tolerance) &&                                    (compare_ray[compare_pilot][3] tolerance) )          (compa
if (compare_pilot == total_qt){          if (compare_ray[compare_pilot][3] tolerance)
(compare_ray[compare_pilot][4] = 1) ;                                    }      }/* if */ } /*for*/ /*for (pilot = 0; pilo
pilot++ ){ printf("compare_ray
[0]=%d,[1]=%d,[2]=%d,[3]=%d",compare_ray[pilot][0],compare_ray[pilot][1],compare_ray[pilot][2],
                compare_ray[pilot][3]);printf(",[4]=%d,[5]=%d,[6]=%d\n",compare_ray[pilot][4],
                compare_ray[pilot][5],compare_ray[pilot][6]);          } */
/*****************************************/compare_pilot = 0; actual_cur_qt = 0; for
(compare_pilot = 0; compare_pilot (total_qt - 1) ; ++compare_pilot) {


 if (compare_ray[compare_pilot][4] == 1)      actual_cur_qt = actual_cur_qt + 1; }/*  for  */
/*************************/*printf("\n,\n,\n,\n,\n,****** CHECK USER
QTY**************\n\n\n\n");*/ if (actual_cur_qt == user_qt){ row = 0; for (compare_pilot = 0;
compare_pilot (total_qt - 1) ; ++compare_pilot) { keep_or_not = compare_ray[compare_pilot][4]; if
(keep_or_not == 1) { /*              curve_keep[next_point][row] = 0;   to initialise */ curve_keep[next_point][row]
compare_ray[compare_pilot][5]; /* curve_keep[next_point][row] = 0;   to initialise */ /*printf("odd row
=%d\n",row);*/      ++row;          curve_keep[next_point][row] = compare_ray[compare_pilot][6];
/*              printf("even row =%d\n",row);*/    ++row;                } } /* for */ /*printf("curve_keep[next_poi
curve_keep[next_point][1] = %d",  curve_keep[next_point][0],curve_keep[next_point][1]);
printf("curve_keep[next_point][2]= %d, curve_keep[next_point][3] = %d",
                curve_keep[next_point][2],curve_keep[next_point][3]); printf("curve_keep[next_point][4]= %d,
curve_keep[next_point][5] = %d",  curve_keep[next_point][4],curve_keep[next_point][5]);*/
next_point++; } /*************************/next_filled = 0; /*  only next  */ pre_pilot =
curr_pilot; curr_pilot = next_pilot; logic = 0; for (pilot = 0; pilot5; pilot++) {     pre_ray[pilot][0] = 0;
pre_ray[pilot][1] = 0;     pre_ray[pilot][2] = 600; } for (pilot = 0; pilot5; pilot++) {    for (row = 0; row
2; row++) {       pre_ray[pilot][row] = curr_ray[pilot][row];    } }
/*********************************************************/for (pilot = 0; pilot5; pilot++) {
curr_ray[pilot][0] = 0;     curr_ray[pilot][1] = 0;     curr_ray[pilot][2] = 600; } for (pilot = 0; pilot5;
pilot++) {    for (row = 0; row  2; row++) {              curr_ray[pilot][row] = next_ray[pilot][row] ;    } }
/*********************************************************/for (pilot = 0; pilot5; pilot++) {
next_ray[pilot][0] = 0;     next_ray[pilot][1] = 0;     next_ray[pilot][2] = 600; }
/*********************************************************/ /*for (pilot = 0; pilot5; pilot++)
{    for (row = 0; row  2; row++) {    printf("pre_ray[pilot][row] = %d \n",pre_ray[pilot][row]);    } }
printf("\n,\n,\n,\n,\n,****** AFTER SWAPPING**************\n\n\n\n"); for (pilot = 0; pilot5;
pilot++) {    for (row = 0; row  2; row++) {    printf("curr_ray[pilot][row] = %d \n",curr_ray[pilot][row]);
} } for (pilot = 0; pilot5; pilot++) {    for (row = 0; row  2; row++) {    printf("next_ray[pilot][row] = %d
\n",next_ray[pilot][row]);    } } */*************************/ } /* big if */ /*  next_point++; */
observer++; if (observer == 4) observer = 3; } /* big for */ /*printf("observer = %d\n",observer);*/ index
= 5; setcolor(&index);


for (a_index = 0; a_index (next_point - 1); a_index++){ x = curve_keep[a_index][0]; x =
xarray[a_index]; y = curve_keep[a_index][1]; y = yarray[a_index]; ptabs(&x,&y); /*printf("x1= %d, y1 =
%d \n",x,y);*/ x = curve_keep[a_index][2]; y = curve_keep[a_index][3]; ptabs(&x,&y); /*printf("x2=
%d, y2 = %d \n",x,y);*/ x = curve_keep[a_index][4]; y = curve_keep[a_index][5]; ptabs(&x,&y);
```

```
/*printf("x3= %d, y3 = %d \n",x,y);*/ } movabs(&x_centre,&y_centre); r = 300; a1 = -0.3926991; a2 =
0.0; index = 9 ; setcolor(&index); pie(&r,&a1,&a2,&index); x = x_centre+5; y = y_centre+1;
movabs(&x,&y); s = 9; index = 9; flood2(&index,&s); index = 0; setcolor(&index);
pie(&r,&a1,&a2,&index);

index = 15 ; setcolor(&index);

for (a_index = 0; a_index (next_point - 1); a_index++){ xarray[a_index] = curve_keep[a_index][0];
yarray[a_index] = curve_keep[a_index][1]; } /* s = next_pilot - 1; x = xarray[0]; y = yarray[0];
movabs(&x,&y); for (a_index = 0; a_index (next_point - 1); a_index++){ x = xarray[a_index]; y =
yarray[a_index]; ptabs(&x,&y,&s); } */

for (a_index = 0; a_index (next_point - 1); a_index++){ x = curve_keep[a_index][0]; y =
curve_keep[a_index][1]; ptabs(&x,&y); /*printf("x1= %d, y1 = %d \n",x,y);*/ x =
curve_keep[a_index][2]; y = curve_keep[a_index][3]; ptabs(&x,&y); /*printf("x2= %d, y2 = %d
\n",x,y);*/ x = curve_keep[a_index][4]; y = curve_keep[a_index][5]; ptabs(&x,&y); /*printf("x3= %d, y3
= %d \n",x,y);*/ }



gwrite(phout); closegraphics(); }/* main */
```

Appendix C1 - Code book

SERIAL NO.:

PATIENT NAME:

REFERENCE:

001. SEX:

1 MALE 2 FEMALE

002. GEOGRAPHICAL DISTRIBUTION:

0 OUTSIDE GLASGOW 1 - - - - - - - - - -85 G1-G85

003. CONSULTANT:

0	DATA NOT AVAILABLE		
1	DR. CANT	2	PROFESSOR
3	DR. DUDGEON	4	DR. JAY
5	DR. DUTTON [SENIOR LECTURER]		

004. AGE OF ONSET (INITIAL) : I N

005. DURATION OF THYROID DISEASE: I N M O N T H E S

006. VISUAL ACUITY (R):

00	DATA NOT AVAILABLE		
01	NPL	10	6/60
02	PL	11	6/36
03	HM	12	6/24
04	CF	13	6/18
05	1/60	14	6/12
06	2/60	15	6/9
07	3/60	16	6/6
08	4/60	17	6/5
09	5/60	18	6/4

007. VISUAL ACUITY (L):

00	DATA NOT AVAILABLE		
01	NPL	10	6/60
02	PL	11	6/36
03	HM	12	6/24
04	CF	13	6/18
05	1/60	14	6/12
06	2/60	15	6/9
07	3/60	16	6/6
08	4/60	17	6/5
09	5/60	18	6/4

008. LID LAG (R):

0	DATA NOT AVAILABLE		
1	NO	2	YES

009. LID LAG (L):

0	DATA NOT AVAILABLE		
1	NO	2	YES

010. LID RETRACTION (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

011. LID RETRACTION (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

012. LID OEDEMA (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

013. LID OEDEMA (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

014. CHEMOSIS (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

015. CHEMOSIS (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

016. PTOSIS (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

017. PTOSIS (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

018. CORNEA (R):

0 DATA NOT AVAILABLE
1 NORMAL 2 STIPPLING
3 ULCER 4 NECROSIS, PERFORATION
5 SCARRING

019. CORNEA (L):

0 DATA NOT AVAILABLE
1 NORMAL 2 STIPPLING
3 ULCER 4 NECROSIS, PERFORATION
5 SCARRING

020. DISK OEDEMA (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

021. DISK OEDEMA (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

022. CHOROIDAL FOLDS (R):

0 DATA NOT AVAILABLE
1 NO 2 YES

023. CHOROIDAL FOLDS (L):

0 DATA NOT AVAILABLE
1 NO 2 YES

024. I.O.P STRAIGHT (R):

0 DATA NOT AVAILABLE
Reading

025. I.O.P STRAIGHT (L):

0 DATA NOT AVAILABLE
Reading

026. I.O.P. UP (R):

0 DATA NOT AVAILABLE
Reading

027. I.O.P. UP (L):

0 DATA NOT AVAILABLE
Reading

028. EXOPHTHALMOMETRY (R):

0 DATA NOT AVAILABLE
Reading

029. EXOPHTHALMOMETRY (L):

0 DATA NOT AVAILABLE
Reading

030. SYMPTOM OF DIPLOPIA:

0 DATA NOT AVAILABLE
1 NONE 2 MILD
3 MODERATE 3 SEVER

031. DIPLOPIA ON EXAMINATION:

0 DATA NOT AVAILABLE
1 ABSENT 2 ON ELEVATION/DEPRESSION
3 ON ADDUCTION/ABDUCTION 4 CLOSE TO MID LINE
5 IN EXTREME GAZE 6 AFTER SURGERY

032. EXTRA-OCULAR MOVEMENTS & HESS CHART (R):

0	DATA NOT AVAILABLE		
1	NORMAL	2	RESTRICTED ON UP GAZE
3	RESTRICTED ON DOWN GAZE	4	RES. UP & DOWN GAZE
5	RESTRICTED ON ADDUCTION	6	RESTRICTED ON ABDUCTION
7	RES. ADD & ABD	8	COMBINATION OF RESTRICTIONS.
9	FIXED EYE		

033. EXTRA-OCULAR MOVEMENTS & HESS CHART (L):

0	DATA NOT AVAILABLE		
1	NORMAL	2	RESTRICTED ON UP GAZE
3	RESTRICTED ON DOWN GAZE	4	RES. UP & DOWN GAZE
5	RESTRICTED ON ADDUCTION	6	RESTRICTED ON ABDUCTION
7	RES. ADD & ABD	8	COMBINATION OF RESTRICTIONS.
9	FIXED EYE		

034. FIELD Score (R):

0 DATA NOT AVAILABLE
Score

035. FIELD Score (L):

0 DATA NOT AVAILABLE
Score

036. FIELD LOSS PATTERN (R):

0	DATA NOT AVAILABLE		
1	NO LOSS	2	ONLY CENTRAL LOSS
3	ONLY PERIPHERAL	4	PERIPHERAL IN ONE QUADRANT
5	MORE THAN ONE QUADRANT	6	CONCENTRIC CONTRACTION

037. FIELD LOSS PATTERN (L):

0	DATA NOT AVAILABLE		
1	NO LOSS	2	ONLY CENTRAL LOSS
3	ONLY PERIPHERAL	4	PERIPHERAL IN ONE QUADRANT
5	MORE THAN ONE QUADRANT	6	CONCENTRIC CONTRACTION

038. FM-100 HUE Score (R):

0 DATA NOT AVAILABLE
Score

039. FM-100 HUE Score (L):

0 DATA NOT AVAILABLE
Score

040. AXIS FM-100 HUE (R):

0 DATA NOT AVAILABLE
Reading

041. AXIS FM-100 HUE (L):

0 DATA NOT AVAILABLE
Reading

042. FLUORESCEIN (R):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

043. FLUORESCEIN (L):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

044. ORBITAL X - RAYS (R):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

045. ORBITAL X - RAYS (L):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

046. ORBITAL U/S (R):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

047. ORBITAL U/S (L):

0	DATA NOT AVAILABLE		
1	NOT DONE	2	NORMAL
3	ABNORMAL		

048. THYROID STATUS (AT ONSET):

0	DATA NOT AVAILABLE		
1	HPERTHYROID	2	HYPOTHYROID
3	EUTHYROID	4	THYROIDITIS

049. GOITRE:

0	DATA NOT AVAILABLE		
1	NO	2	YES

050. PRETIBIAL DERMOPATHY:

0	DATA NOT AVAILABLE		
1	NO	2	YES

051. THYROID ACROPACHY:

0	DATA NOT AVAILABLE		
1	NO	2	YES

052. MYOPATHY:

0	DATA NOT AVAILABLE		
1	NO	2	YES

053. CARDIAC FAILURE:

0 DATA NOT AVAILABLE
1 NO 2 YES

054. SERUM P.B.I.:

0 DATA NOT AVAILABLE
Reading

055. T3 RESIN UPTAKE :

0 DATA NOT AVAILABLE
Reading

056. RESIN UPTAKE RATIO:

0 DATA NOT AVAILABLE
Reading

057. "FREE THYROXIN INDEX":

0 DATA NOT AVAILABLE
Reading

058. RADIOIODINE UPTAKE:

0 DATA NOT AVAILABLE
Reading

059. TOTAL T4:

0 DATA NOT AVAILABLE
Reading

060. TOTAL T3:

0 DATA NOT AVAILABLE
Reading

061. TSH:

0 DATA NOT AVAILABLE
Reading

062. Rx. CARBIMAZOLE ONLY:

0 DATA NOT AVAILABLE 1 NO 2 YES

063. Rx. PROPRANOLOL:

0 DATA NOT AVAILABLE 1 NO 2 YES

064. Rx. T4:

0 DATA NOT AVAILABLE 1 NO 2 YES

065. Rx. T3:

0 DATA NOT AVAILABLE 1 NO 2 YES

066. Rx. RADIOIODINE:

0 DATA NOT AVAILABLE 1 NO 2 YES

067. PARTIAL THYROIDECTOMY:

0 DATA NOT AVAILABLE 1 NO 2 YES

068. TOTAL THYROIDECTOMY:

0 DATA NOT AVAILABLE 1 NO 2 YES

069. HISTOPATHOLOGY (Thyroid):

0 DATA NOT AVAILABLE 1 NO 2 YES

070. DIABETES:

0 DATA NOT AVAILABLE 1 NO 2 YES

071. HPERTENSION:

0 DATA NOT AVAILABLE 1 NO 2 YES

072. DATA NOT COMPLETE:

0	COMPLETE	1	MICROFICHE
2	CASE NOTE NOT FOUND	3	INFORMATION NOT WRITTEN
4	DISCHARGED	5	MOVED
6	GOT BETTER	7	DIED

073. APPOINTMENT SENT:

0 NO 1 ATTENDED 2 D.N.A

074. DURATION (FINAL) : Y E A R S

075. VISUAL ACUITY (R) (FINAL) :

00	DATA NOT AVAILABLE		
01	NPL	10	6/60
02	PL	11	6/36
03	HM	12	6/24
04	CF	13	6/18
05	1/60	14	6/12
06	2/60	15	6/9
07	3/60	16	6/6
08	4/60	17	6/5
09	5/60	18	6/4

076. VISUAL ACUITY (L) (FINAL) :

00	DATA NOT AVAILABLE		
01	NPL	10	6/60
02	PL	11	6/36
03	HM	12	6/24
04	CF	13	6/18
05	1/60	14	6/12
06	2/60	15	6/9
07	3/60	16	6/6
08	4/60	17	6/5
09	5/60	18	6/4

077. LID LAG (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

078. LID LAG (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

079. LID RETRACTION (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

080. LID RETRACTION (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

081. LID OEDEMA (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

082. LID OEDEMA (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

083. CHEMOSIS (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

084. CHEMOSIS (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

085. PTOSIS (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

086. PTOSIS (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

087. CORNEA (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NORMAL 2 STIPPLING
3 ULCER 4 NECROSIS, PERFORATION
5 SCARRING

088. CORNEA (L) (FINAL) :

0	DATA NOT AVAILABLE		
1	NORMAL	2	STIPPLING
3	ULCER	4	NECROSIS, PERFORATION
5	SCARRING		

089. DISK OEDEMA (R) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO	2	YES

090. DISK OEDEMA (L) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO	2	YES

091. CHOROIDAL FOLDS (R) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO	2	YES

092. CHOROIDAL FOLDS (L) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO	2	YES

093. I.O.P STRAIGHT (R) (FINAL) :

0 DATA NOT AVAILABLE
Reading

094. I.O.P STRAIGHT (L) (FINAL) :

0 DATA NOT AVAILABLE
Reading

095. I.O.P. UP (R) (FINAL) :

0 DATA NOT AVAILABLE
Reading

096. I.O.P. UP (L) (FINAL) :

0 DATA NOT AVAILABLE
Reading

097. EXOPHTHALMOMETRY (R) (FINAL) :

0 DATA NOT AVAILABLE
Reading

098. EXOPHTHALMOMETRY (L) (FINAL) :

0 DATA NOT AVAILABLE
Reading

099. SYMPTOM OF DIPLOPIA (FINAL) :

0	DATA NOT AVAILABLE		
1	NONE	2	MILD
3	MODERATE	3	SEVER

100. DIPLOPIA ON EXAMINATION (FINAL) :

0	DATA NOT AVAILABLE		
1	ABSENT	2	ON ELEVATION/DEPRESSION
3	ON ADDUCTION/ABDUCTION	4	CLOSE TO MID LINE
5	IN EXTREME GAZE	6	AFTER SURGERY

101. EXTRA-OCULAR MOVEMENTS & HESS CHART (R) (FINAL) :

0	DATA NOT AVAILABLE		
1	NORMAL	2	RESTRICTED ON UP GAZE
3	RESTRICTED ON DOWN GAZE	4	RES. UP & DOWN GAZE
5	RESTRICTED ON ADDUCTION	6	RESTRICTED ON ABDUCTION
7	RES. ADD & ABD	8	COMBINATION OF RESTRICTIONS.
9	FIXED EYE		

102. EXTRA-OCULAR MOVEMENTS & HESS CHART (L) (FINAL) :

0	DATA NOT AVAILABLE		
1	NORMAL	2	RESTRICTED ON UP GAZE
3	RESTRICTED ON DOWN GAZE	4	RES. UP & DOWN GAZE
5	RESTRICTED ON ADDUCTION	6	RESTRICTED ON ABDUCTION
7	RES. ADD & ABD	8	COMBINATION OF RESTRICTIONS.
9	FIXED EYE		

103. FIELD Score (R) (FINAL) :

0 DATA NOT AVAILABLE
Score

104. FIELD Score (L) (FINAL) :

0 DATA NOT AVAILABLE
Score

105. FIELD LOSS PATTERN (R) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO LOSS	2	ONLY CENTRAL LOSS
3	ONLY PERIPHERAL	4	PERIPHERAL IN ONE QUADRANT
5	MORE THAN ONE QUADRANT	6	CONCENTRIC CONTRACTION

106. FIELD LOSS PATTERN (L) (FINAL) :

0	DATA NOT AVAILABLE		
1	NO LOSS	2	ONLY CENTRAL LOSS
3	ONLY PERIPHERAL	4	PERIPHERAL IN ONE QUADRANT
5	MORE THAN ONE QUADRANT	6	CONCENTRIC CONTRACTION

107. FM-100 HUE Score (R) (FINAL) :

0 DATA NOT AVAILABLE
Score

108. FM-100 HUE Score (L) (FINAL) :

0 DATA NOT AVAILABLE
Score

109. AXIS FM-100 HUE (R) (FINAL) :

0 DATA NOT AVAILABLE
Reading

110. AXIS FM-100 HUE (L) (FINAL) :

0 DATA NOT AVAILABLE
Reading

111. FLUORESCEIN (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

112. FLUORESCEIN (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

113. ORBITAL X - RAYS (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

114. ORBITAL X - RAYS (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

115. ORBITAL U/S (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

116. ORBITAL U/S (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NOT DONE 2 NORMAL
3 ABNORMAL

117. TARSORRHAPHY (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

118. TARSORRHAPHY (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

119. DECOMPRESSION (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

120. DECOMPRESSION (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

121. MUSCLE SURGERY (R) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

122. MUSCLE SURGERY (L) (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

123. GUANETHIDINE (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

124. SYSTEMIC STEROIDS (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

125. THYROID STATUS (FINAL) :

0 DATA NOT AVAILABLE
1 HPERTHYROID 2 HYPOTHYROID
3 EUTHYROID 4 THYROIDITIS

126. GOITRE (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

127. PRETIBIAL (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

128. THYROID ACROPACHY (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

129. MYOPATHY (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

130. CARDIAC FAILURE (FINAL) :

0 DATA NOT AVAILABLE
1 NO 2 YES

131. SERUM P.B.I. (FINAL) :

0 DATA NOT AVAILABLE
Reading

132. T3 RESIN UPTAKE (FINAL) :

0 DATA NOT AVAILABLE
Reading

133. RESIN UPTAKE RATIO (FINAL) :

0 DATA NOT AVAILABLE
Reading

134. "FREE THYROXIN INDEX" (FINAL) :

0 DATA NOT AVAILABLE
Reading

135. RADIOIODINE UPTAKE (FINAL) :

0 DATA NOT AVAILABLE
Reading

136. TOTAL T4 (FINAL) :

0 DATA NOT AVAILABLE
Reading

137. TOTAL T3 (FINAL) :

0 DATA NOT AVAILABLE
Reading

138. TSH (FINAL) :

0 DATA NOT AVAILABLE
Reading

139. Rx. CARBIMAZOLE ONLY (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

140. Rx. PROPRANOLOL (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

141. Rx. T4 (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

142. Rx. T3 (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

143. Rx. RADIOIODINE (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

144. PARTIAL THYROIDECTOMY (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

145. TOTAL THYROIDECTOMY (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

146. HISTOPATHOLOGY (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

147. DIABETES (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

148. HPERTENSION (FINAL) :

0 DATA NOT AVAILABLE 1 NO 2 YES

149. DATA NOT COMPLETE (FINAL) :

1 MICROFICHE 2 CASE NOTE NOT FOUND
3 INFORMATION NOT WRITTEN

150. PATIENT ALIVE (FINAL) :

1 NO 2 YES

151. APPOINTMENT SENT (FINAL) :

1 NO 2 ATTENDED 3 D.N.A

152. FOR DETAILED DISEASE PATTERN :

1 NO 2 YES

153. CALL THE PATIENT :

1 NO 2 YES

Appendix C2 - SPSS/PC+

SPSS/PC+ is a data analysis software family which consists of a base package plus a number of add-on options. It has been adapted for the IBM/PC and compatible computers from the original SPSSx which has been written for Mainframe computers.

SPSS/PC DATA ENTRY II MODULE is an integrated data entry, cleaning and editing tool with user-defined skip logic, rules and input screens. It creates a spread sheet format or custom designed forms for entering data into SPSSx, or other leading software such as Lotus 1-2-3 and dBase, and translates any of these files directly into another.

The SPSS/PC+ BASE MODULE contains all data and file handling routines; descriptive, categorical, correlation, regression, and analysis of variance procedures; in addition to full report writing and plotting functions. This module is necessary to running the other options.

SPSS/PC ADVANCED STATISTICS MODULE contains sophisticated statistical procedures such as factor, discriminant analyses, and multivariate analysis of variance.

SPSS/PC TABLES displays results in any tabular form, from complex stub and banner cross tabulations and display of multiple response data to frequency counts and descriptive statistics.

SPSS/PC+ DATA ENTRY II runs under PC or MS DOS 2.0 or later on IBM PC's and many compatibles with 512 memory. A hard disk is highly recommended. The SPSS/PC+ family runs under PC or MS DOS 2.0 or later on IBM PC/XTs or ATs and many compatibles. Minimum requirements ranges from 384 to 640 KB depending on the modules available.

Appendix C3 - Selected summary statistics and contengency tables of dysthyroid ophthalmopathy patients.

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Summary statistics

Follow-up peroid in years	
Mean	10
Standard Deviation	6
Mode	10
Variance	31
Minimum	4
Maximum	40

TABLE A.1
Follow-up peroid in years
for the whole series.

Summary statistics

Duration of thyroid dysfunction	
Mean	47
Standard Deviation	77
Mode	12
Variance	5951
Minimum	1
Maximum	444

TABLE A.2
Duration (in months) from the date of diagnosis of thyroid dysfunction to the onset of ophthalmopathy for the whole series.

Summary statistics

Patient age	
Mean	49
Standard Deviation	14
Variance	186
Minimum	17
Maximum	86

TABLE A.3
Age (in years) of the studies group.

Summary statistics

	Frequency	Percent
Patient sex Male Female	 50 174	 22.3% 77.7%
TOTAL	224	100.0%

TABLE A.3(b)
Frequency distribution of sex in the series.

Thyroid status

	Decompression R.		Row total
	No	Yes	
Thyroid status at onset Hyperthyroid	 87 83.7% 46.8%	 17 16.3% 44.7%	 104 100.0% 46.4%
Hypothyroid	58 81.7% 31.2%	13 18.3% 34.2%	71 100.0% 31.7%
Euthyroid	41 83.7% 22.0%	8 16.3% 21.1%	49 100.0% 21.9%
Column total	186 83.0% 100.0%	38 17.0% 100.0%	224 100.0% 100.0%

TABLE A.4
The relationship of thyroid status at presentation to the need for surgical orbital decompression

Muscle surgery

	Symptom of diplopia				Row total
	No diplopia	Mild diplopia	Moderate diplopia	Severe diplopia	
Muscle surgery R. No	111 68.5% 94.1%	37 22.8% 80.4%	9 5.6% 42.9%	5 3.1% 50.0%	162 100.0% 83.1%
Yes	7 21.2% 5.9%	9 27.3% 19.6%	12 36.4% 57.1%	5 15.2% 50.0%	33 100.0% 16.9%
Column total	118 60.5% 100.0%	46 23.6% 100.0%	21 10.8% 100.0%	10 5.1% 100.0%	195 100.0% 100.0%

TABLE A.5
The relationship between diplopia as a presenting symptom and the need for muscle surgery.

Muscle surgery

	Muscle surgery R.		Row total
	No	Yes	
Diplopia on examination No diplopia	91 94.8% 56.9%	5 5.2% 15.2%	96 100.0% 49.7%
Up / down	6 60.0% 3.8%	4 40.0% 12.1%	10 100.0% 5.2%
Add / abd	10 47.6% 6.3%	11 52.4% 33.3%	21 100.0% 10.9%
Close to midline	21 95.5% 13.1%	1 4.5% 3.0%	22 100.0% 11.4%
Extreme gaze	32 72.7% 20.0%	12 27.3% 36.4%	44 100.0% 22.8%
Column total	160 82.9% 100.0%	33 17.1% 100.0%	193 100.0% 100.0%

TABLE A.6(a)
The relationship between diplopia as elicited at onset and the need for muscle surgery.

Muscle surgery

	Muscle surgery R.		Row total
	No	Yes	
Ocular motility R. Normal	85 95.5% 54.5%	4 4.5% 12.1%	89 100.0% 47.1%
R. Up gaze	23 71.9% 14.7%	9 28.1% 27.3%	32 100.0% 16.9%
R. Down gaze	1 50.0% .6%	1 50.0% 3.0%	2 100.0% 1.1%
R. Up & Down	8 80.0% 5.1%	2 20.0% 6.1%	10 100.0% 5.3%
R. Add	1 100.0% .6%		1 100.0% .5%
R. Add & Abd	8 66.7% 5.1%	4 33.3% 12.1%	12 100.0% 6.3%
Combination	30 69.8% 19.2%	13 30.2% 39.4%	43 100.0% 22.8%
Column total	156 82.5% 100.0%	33 17.5% 100.0%	189 100.0% 100.0%

TABLE A.6(b)
The relationship between extraocular muscle dysfunction at onset on orthoptic assessment and the need for muscle surgery.

Final thyroid status

	Frequency	Percent
Thyroid status final		
Hypothyroid	7	14.6%
Euthyroid	41	85.4%
TOTAL	48	100.0%

TABLE A.7
Thyroid status at final assessment.

Summary statistics

	Patient sex	
	Male	Female
Age collapsed into categories 10 - 19 years	2 40.0% 4.0%	3 60.0% 1.7%
20 - 29 years	4 23.5% 8.0%	13 76.5% 7.5%
30 - 39 years	5 16.7% 10.0%	25 83.3% 14.4%
40 - 49 years	13 20.6% 26.0%	50 79.4% 28.7%
50 - 59 years	13 19.7% 26.0%	53 80.3% 30.5%
60 - 69 years	11 34.4% 22.0%	21 65.6% 12.1%
70 - 79 years	2 28.6% 4.0%	5 71.4% 2.9%
80 - 89 years		4 100.0% 2.3%
Column total	50 22.3% 100.0%	174 77.7% 100.0%

TABLE A.8
Age group frequencies of males and females.

Age groups

	Frequency	Percent
Age collapsed into categories		
10 - 19 years	5	2.2%
20 - 29 years	17	7.6%
30 - 39 years	30	13.4%
40 - 49 years	63	28.1%
50 - 59 years	66	29.5%
60 - 69 years	32	14.3%
70 - 79 years	7	3.1%
80 - 89 years	4	1.8%
TOTAL	224	100.0%

TABLE A.9
Frequencies of different age groups.

Follow-up period

	Frequency	Percent
Follow-up peroid in years		
< 5 years	46	20.5%
6 - 10 years	105	46.9%
11 - 15 years	31	13.8%
16 - 20 years	36	16.1%
21 - 25 years	3	1.3%
> 25 years	3	1.3%
TOTAL	224	100.0%

TABLE A.10
Frequencies of groups of follow-up peroid in years.

Thyroid status

	Frequency	Percent
Thyroid status at onset		
Hyperthyroid	104	46.4%
Hypothyroid	71	31.7%
Euthyroid	49	21.9%
TOTAL	224	100.0%

TABLE A.11
Thyroid status of the whole series at onset.

Treatment of Hyperthyroidism

	Frequency	Percent
Radio Iodine Rx		
No	126	61.8%
Yes	78	38.2%
Partial thyroidectomy		
No	166	80.6%
Yes	40	19.4%
Carbimazole Rx only		
No	111	56.1%
Yes	87	43.9%

TABLE A.12
Treatment recieved for hyperthyroidism
before the onset of ophthalmopathy.

Thyroid and ocular myopathy

	Myopathy		Row total
	No	Yes	
Diplopia on examination			
No diplopia	91 100.0% 50.0%		91 100.0% 49.5%
Up / down	8 88.9% 4.4%	1 11.1% 50.0%	9 100.0% 4.9%
Add / abd	23 100.0% 12.6%		23 100.0% 12.5%
Close to midline	21 100.0% 11.5%		21 100.0% 11.4%
Extreme gaze	39 97.5% 21.4%	1 2.5% 50.0%	40 100.0% 21.7%
Column total	182 98.9% 100.0%	2 1.1% 100.0%	184 100.0% 100.0%

TABLE A.13
Thyroid myopathy in relation to extraocular muscle dysfunction at onset.

Thyroid and ocular myopathy

	Myopathy		Row total
	No	Yes	
Diplopia on examination final			
No diplopia	70		70
	100.0%		100.0%
	68.6%		67.3%
Up / Down	17		17
	100.0%		100.0%
	16.7%		16.3%
Add / Abd	5	1	6
	83.3%	16.7%	100.0%
	4.9%	50.0%	5.8%
Extreme gaze	10	1	11
	90.9%	9.1%	100.0%
	9.8%	50.0%	10.6%
Column total	102	2	104
	98.1%	1.9%	100.0%
	100.0%	100.0%	100.0%

TABLE A.14
Thyroid myopathy in relation to final extraocular muscle dysfunction.

Mild and severe groups

	Severity of Disease Rt.			
	mild		severe	
	Frequency	Percent	Frequency	Percent
Radio Iodine Rx				
No	98	48.0%	28	13.7%
Yes	55	27.0%	23	11.3%
Partial thyroidectomy				
No	125	60.7%	41	19.9%
Yes	29	14.1%	11	5.3%
Carbimazole Rx only				
No	84	42.4%	27	13.6%
Yes	63	31.8%	24	12.1%

TABLE A.15
Treatment of thyroid dysfunction in relation to severity of ophthalmopathy.

Duration of thyroid dysfunction

	Duration collapsed into categories					
	< 6M	6m - 1 year	2 - 3 years	4 - 5 years	6 - 7 years	8 - 10 years
Severity of Disease Rt. mild	23 20.2% 59.0%	25 21.9% 69.4%	19 16.7% 76.0%	20 17.5% 71.4%	8 7.0% 88.9%	5 4.4% 83.3%
severe	16 33.3% 41.0%	11 22.9% 30.6%	6 12.5% 24.0%	8 16.7% 28.6%	1 2.1% 11.1%	1 2.1% 16.7%
Column total	39 24.1% 100.0%	36 22.2% 100.0%	25 15.4% 100.0%	28 17.3% 100.0%	9 5.6% 100.0%	6 3.7% 100.0%

TABLE A.16
Duration categories of thyroid dysfunction (in years)
before the onset of ophthalmopathy

(continue

Duration of thyroid dysfunction

	Duration collapsed into categories					Row total
	11 - 15 years	16 - 20 years	21 - 25 years	26 - 30 years	Over 30 years	
Severity of Disease Rt. mild	5 4.4% 71.4%	4 3.5% 66.7%	2 1.8% 66.7%	2 1.8% 100.0%	1 .9% 100.0%	114 100.0% 70.4%
severe	2 4.2% 28.6%	2 4.2% 33.3%	1 2.1% 33.3%			48 100.0% 29.6%
Column total	7 4.3% 100.0%	6 3.7% 100.0%	3 1.9% 100.0%	2 1.2% 100.0%	1 .6% 100.0%	162 100.0% 100.0%

TABLE A.16
Duration categories of thyroid dysfunction (in years)
before the onset of ophthalmopathy

Thyroid dysfunction

	Frequency	Percent
Duration collapsed into categories		
< 6M	46	24.2%
6m - 1 year	38	20.0%
2 - 3 years	27	14.2%
4 - 5 years	35	18.4%
6 - 7 years	10	5.3%
8 - 10 years	7	3.7%
11 - 15 years	10	5.3%
16 - 20 years	9	4.7%
21 - 25 years	4	2.1%
26 - 30 years	2	1.1%
Over 30 years	2	1.1%
TOTAL	190	100.0%

TABLE A.17
Duration categories of thyroid dysfunction in years.

Duration of thyroid dysfunction

	Partial thyroidectomy			
	No		Yes	
	Severity of Disease Rt.		Severity of Disease Rt.	
	mild	severe	mild	severe
Duration of thyroid dysfunction				
Mean	35	27	101	124
Count	125	41	29	11
Count Percent	60.7%	19.9%	14.1%	5.3%

TABLE A.18
Effect of partial thyroidectomy prior to the onset of ophthalmopathy on the time (in months) from the onset of thyroid dysfunction to the presentstion with ophthalmopathy in the mild and severe forms.

Duration of thyroid dysfunction

	Radio Iodine Rx			
	No		Yes	
	Severity of Disease Rt.		Severity of Disease Rt.	
	mild	severe	mild	severe
Duration of thyroid dysfunction				
Mean	36	37	70	56
Count	98	28	55	23
Count Percent	48.0%	13.7%	27.0%	11.3%

TABLE A.19
The relationship of previous radioiodine treatment to the time (in months) from the onset of thyroid dysfunction to the development of ophthalmopathy.

	Severity of Disease Rt.			
	mild		severe	
	Count	Count Percent	Count	Count Percent
Visual acuity				
CF	1	.5%		
2/60	1	.5%		
5/60	1	.5%		
6/60			1	.5%
6/36			1	.5%
6/24	5	2.4%		
6/18	8	3.9%	6	2.9%
6/12	5	2.4%	5	2.4%
6/9	33	15.9%	12	5.8%
6/6	68	32.9%	17	8.2%
6/5	31	15.0%	9	4.3%
6/4			3	1.4%
Visual acuity R. final				
NPL			1	.7%
HM			1	.7%
CF	2	1.5%		
3/60	1	.7%	1	.7%
4/60			1	.7%
6/60	2	1.5%		
6/36			2	1.5%
6/24	1	.7%		
6/18	6	4.5%	2	1.5%
6/12	6	4.5%	9	6.7%
6/9	19	14.2%	10	7.5%
6/6	38	28.4%	16	11.9%
6/5	10	7.5%	6	4.5%

TABLE A.20
The frequency distribution of varoius levels of visual acuity in the mild and severe groups at the onset of ophthalmopathy.

Mild and Severe Ophthalmopathy groups

	Patient sex					
	Male			Female		
	Patient age			Patient age		
	Mean age	Count	Percent	Mean age	Count	Percent
Severity of Disease Rt.						
mild	47.7	34	68.0%	49.1	133	76.4%
severe	53.3	16	32.0%	45.9	41	23.6%
Column total	49.5	50	100.0%	48.3	174	100.0%

TABLE A.21
The mean age (in years) of males and females
in the mild and severe groups.

Muscle surgery

	Severity of Disease Rt.		Row total
	mild	severe	
Muscle surgery R.			
No	129 78.7% 91.5%	35 21.3% 62.5%	164 100.0% 83.2%
Yes	12 36.4% 8.5%	21 63.6% 37.5%	33 100.0% 16.8%
Column total	141 71.6% 100.0%	56 28.4% 100.0%	197 100.0% 100.0%

TABLE A.22
The relationship of extraocular muscle
surgery and the severity of ophthalmopathy.

Mild and Severe Ophthalmopathy groups

	Severity of Disease Rt.					
	mild			severe		
	Patient age			Patient age		
	Mean age	Count	Percent	Mean age	Count	Percent
Patient sex						
Male	47.7	34	20.4%	53.3	16	28.1%
Female	49.1	133	79.6%	45.9	41	71.9%
Column total	48.8	167	100.0%	48.0	57	100.0%

TABLE A.23
The mean age (in years) of mild and severe ophthalmopathy groups for males and females.

Mild and Severe Ophthalmopathy groups

	Severity of Disease Rt.					
	mild			severe		
	Duration of thyroid dysfunction			Duration of thyroid dysfunction		
	Mean duration	Count	Percent	Mean duration	Count	Percent
Patient sex						
Male	21.4	34	20.4%	26.8	16	28.1%
Female	54.5	133	79.6%	51.4	41	71.9%
Column total	47.8	167	100.0%	44.5	57	100.0%

TABLE A.24
The mean duration (in months) of thyroid dysfunction before the onset of ophthalmopathy in mild and severe groups for male and female patients.

Mild and Severe Ophthalmopathy groups

	Patient sex					
	Male			Female		
	Duration of thyroid dysfunction			Duration of thyroid dysfunction		
	Mean duration	Count	Percent	Mean duration	Count	Percent
Severity of Disease Rt.						
mild	21.4	34	68.0%	54.5	133	76.4%
severe	26.8	16	32.0%	51.4	41	23.6%
Column total	23.1	50	100.0%	53.8	174	100.0%

TABLE A.25
The mean duration (in years) of thyroid dysfunction before the onset of ophthalmopathy in mild and severe groups for males and females.

Mild and Severe Ophthalmopathy groups

	Severity of Disease Rt.					
	mild			severe		
	Follow-up peroid in years			Follow-up peroid in years		
	Mean followup	Count	Percent	Mean followup	Count	Percent
Patient sex						
Male	10.8	34	20.4%	8.2	16	28.1%
Female	10.6	133	79.6%	10.3	41	71.9%
Column total	10.6	167	100.0%	9.7	57	100.0%

TABLE A.26
The mean follow-up time (in years) of mild and severe groups for male and female patients.

Mild and Severe Ophthalmopathy groups

	Patient sex					
	Male			Female		
	Follow-up peroid in years			Follow-up peroid in years		
	Mean followup	Count	Percent	Mean followup	Count	Percent
Severity of Disease Rt.						
mild	10.8	34	68.0%	10.6	133	76.4%
severe	8.2	16	32.0%	10.3	41	23.6%
Column total	10.0	50	100.0%	10.5	174	100.0%

TABLE A.27
The mean follow-up time (in years) for males and females in mild and severe ophthalmopathy groups.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
IOP straight R.		
Mean IOP st.	16.8	19.0
Standard Deviation	4	4
Variance	16	20
Maximum	30	35
Minimum	8	11
Count	167	57

TABLE A.28
Intraocular pressure in the mild and severe groups at the onset of ophthalmopathy.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
IOP straight R. final		
Mean IOP st.	16.2	16.2
Standard Deviation	3	3
Variance	9	9
Maximum	22	22
Minimum	9	10
Count	167	57

TABLE A.29
Intraocular pressure at final assessment of the mild and severe groups of patients.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
IOP up R.		
Mean IOP up.	22.5	25.6
Standard Deviation	6	5
Variance	32	28
Maximum	39	34
Minimum	14	16
Count	167	57

TABLE A.30
Intraocular pressure on up gaze at the onset of ophthalmopathy in the mild and severe groups.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
IOP up R. final		
Mean IOP up.	21.0	19.2
Standard Deviation	5	4
Variance	26	12
Maximum	36	25
Minimum	14	16
Count	167	57

TABLE A.31
Intraocular pressure on up gaze of the mild and severe groups at final assessment.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
Exophthalmos R.		
Mean Exophthalmos:	20.6	22.9
Standard Deviation	3	4
Variance	9	15
Maximum	28	30
Minimum	11	15
Count	167	57

TABLE A.32
Exophthalmometric reading in mm. at the onset of ophthalmopathy in the mild and severe groups.

Summary statistics

	Severity of Disease Rt.	
	mild	severe
Exophthalmos R. final		
Mean Exophthalmos:	20.6	20.5
Standard Deviation	3	4
Variance	8	15
Maximum	26	29
Minimum	15	13
Count	167	57

TABLE A.33
Exophthalmometric reading in mm. of mild and severe groups at final assessment.

	Severity of Disease Rt.		Row total
	mild	severe	
Tarsorrhaphy R. No	128 74.9% 94.1%	43 25.1% 87.8%	171 100.0% 92.4%
Yes	8 57.1% 5.9%	6 42.9% 12.2%	14 100.0% 7.6%
Column total	136 73.5% 100.0%	49 26.5% 100.0%	185 100.0% 100.0%

TABLE A.34
The relationship between the severity of ophthalmopathy and the need for trasorrhaphy.

	Severity of Disease Rt.		Row total
	mild	severe	
Guanethidine No	91 72.2% 64.5%	35 27.8% 62.5%	126 100.0% 64.0%
Yes	50 70.4% 35.5%	21 29.6% 37.5%	71 100.0% 36.0%
Column total	141 71.6% 100.0%	56 28.4% 100.0%	197 100.0% 100.0%

TABLE A.35
The relationship of Guanethidine therapy
to the severity of the disease.

Age groups

	Severity of Disease Rt.		Row total
	mild	severe	
Age collapsed into categories 10 - 19 years	3 60.0% 1.8%	2 40.0% 3.5%	5 100.0% 2.2%
20 - 29 years	13 76.5% 7.8%	4 23.5% 7.0%	17 100.0% 7.6%
30 - 39 years	24 80.0% 14.4%	6 20.0% 10.5%	30 100.0% 13.4%
40 - 49 years	48 76.2% 28.7%	15 23.8% 26.3%	63 100.0% 28.1%
50 - 59 years	43 65.2% 25.7%	23 34.8% 40.4%	66 100.0% 29.5%
60 - 69 years	27 84.4% 16.2%	5 15.6% 8.8%	32 100.0% 14.3%
70 - 79 years	6 85.7% 3.6%	1 14.3% 1.8%	7 100.0% 3.1%
80 - 89 years	3 75.0% 1.8%	1 25.0% 1.8%	4 100.0% 1.8%
Column total	167 74.6% 100.0%	57 25.4% 100.0%	224 100.0% 100.0%

TABLE A.36
Age groups of mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Duration collapsed into categories < 6M	48 69.6% 28.7%	21 30.4% 36.8%	69 100.0% 30.8%
6m - 1 year	37 75.5% 22.2%	12 24.5% 21.1%	49 100.0% 21.9%
2 - 3 years	21 77.8% 12.6%	6 22.2% 10.5%	27 100.0% 12.1%
4 - 5 years	26 74.3% 15.6%	9 25.7% 15.8%	35 100.0% 15.6%
6 - 7 years	9 90.0% 5.4%	1 10.0% 1.8%	10 100.0% 4.5%
8 - 10 years	6 85.7% 3.6%	1 14.3% 1.8%	7 100.0% 3.1%
11 - 15 years	7 70.0% 4.2%	3 30.0% 5.3%	10 100.0% 4.5%
16 - 20 years	7 77.8% 4.2%	2 22.2% 3.5%	9 100.0% 4.0%
21 - 25 years	3 75.0%	1 25.0%	4 100.0%

TABLE A.37
The time (in years) from the diagnosis of thyroid dysfunction to the onset of ophthalmopathy.

(continue

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
	1.8%	1.8%	1.8%
26 - 30 years	2 100.0% 1.2%		2 100.0% .9%
Over 30 years	1 50.0% .6%	1 50.0% 1.8%	2 100.0% .9%
Column total	167 74.6% 100.0%	57 25.4% 100.0%	224 100.0% 100.0%

TABLE A.37
The time (in years) from the diagnosis of thyroid dysfunction to the onset of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Follow-up peroid in years < 5 years	32 69.6% 19.2%	14 30.4% 24.6%	46 100.0% 20.5%
6 - 10 years	81 77.1% 48.5%	24 22.9% 42.1%	105 100.0% 46.9%
11 - 15 years	21 67.7% 12.6%	10 32.3% 17.5%	31 100.0% 13.8%
16 - 20 years	28 77.8% 16.8%	8 22.2% 14.0%	36 100.0% 16.1%
21 - 25 years	3 100.0% 1.8%		3 100.0% 1.3%
> 25 years	2 66.7% 1.2%	1 33.3% 1.8%	3 100.0% 1.3%
Column total	167 74.6% 100.0%	57 25.4% 100.0%	224 100.0% 100.0%

TABLE A.38
Follow-up peroid in years.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid Lag R. No lid lag	18 94.7% 11.8%	1 5.3% 2.0%	19 100.0% 9.3%
Lid lag	135 73.0% 88.2%	50 27.0% 98.0%	185 100.0% 90.7%
Column total	153 75.0% 100.0%	51 25.0% 100.0%	204 100.0% 100.0%

TABLE A.39
The relationship of lid lag at presentation to the severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid lag R. final No lid lag	25 73.5% 37.3%	9 26.5% 25.7%	34 100.0% 33.3%
Lid lag	42 61.8% 62.7%	26 38.2% 74.3%	68 100.0% 66.7%
Column total	67 65.7% 100.0%	35 34.3% 100.0%	102 100.0% 100.0%

TABLE A.40
The relationship between severity of ophthalmopathy to lid lag at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid retraction R. No lid retraction	21 95.5% 13.5%	1 4.5% 1.9%	22 100.0% 10.5%
Lid retraction	135 72.2% 86.5%	52 27.8% 98.1%	187 100.0% 89.5%
Column total	156 74.6% 100.0%	53 25.4% 100.0%	209 100.0% 100.0%

TABLE A.41
The relationship between lid retraction at presentation to the severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid retraction R. final No lid retraction	26 76.5% 38.2%	8 23.5% 22.9%	34 100.0% 33.0%
Lid retraction	42 60.9% 61.8%	27 39.1% 77.1%	69 100.0% 67.0%
Column total	68 66.0% 100.0%	35 34.0% 100.0%	103 100.0% 100.0%

TABLE A.42
The relationship between severity of ophthalmopathy to lid retraction at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid oedema R. No lid oedema	102 82.9% 69.4%	21 17.1% 41.2%	123 100.0% 62.1%
Lid oedema	45 60.0% 30.6%	30 40.0% 58.8%	75 100.0% 37.9%
Column total	147 74.2% 100.0%	51 25.8% 100.0%	198 100.0% 100.0%

TABLE A.43
The relationship between lid oedema
at onset and severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Lid oedema R. final No lid oedema	64 65.3% 94.1%	34 34.7% 89.5%	98 100.0% 92.5%
Lid oedema	4 50.0% 5.9%	4 50.0% 10.5%	8 100.0% 7.5%
Column total	68 64.2% 100.0%	38 35.8% 100.0%	106 100.0% 100.0%

TABLE A.44
The relationship between severity of ophthalmopathy
to lid oedema at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Chemosis R. No Chemosis	125 79.1% 86.2%	33 20.9% 64.7%	158 100.0% 80.6%
Chemosis	20 52.6% 13.8%	18 47.4% 35.3%	38 100.0% 19.4%
Column total	145 74.0% 100.0%	51 26.0% 100.0%	196 100.0% 100.0%

TABLE A.45
The relationship between chemosis at onset to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Chemosis R. final No Chemosis	67 65.7% 100.0%	35 34.3% 97.2%	102 100.0% 99.0%
Chemosis		1 100.0% 2.8%	1 100.0% 1.0%
Column total	67 65.0% 100.0%	36 35.0% 100.0%	103 100.0% 100.0%

TABLE A.46
The relationship between severity of ophthalmopathy to chemosis at final examination.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Ptosis R. No ptosis	150 74.3% 99.3%	52 25.7% 100.0%	202 100.0% 99.5%
Ptosis	1 100.0% .7%		1 100.0% .5%
Column total	151 74.4% 100.0%	52 25.6% 100.0%	203 100.0% 100.0%

TABLE A.47
The relationship between ptosis at presentation to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Cornea R. Normal cornea	138 76.7% 85.7%	42 23.3% 73.7%	180 100.0% 82.6%
Punctate keratitis	21 63.6% 13.0%	12 36.4% 21.1%	33 100.0% 15.1%
Corneal ulceration	1 25.0% .6%	3 75.0% 5.3%	4 100.0% 1.8%
Corneal scarring	1 100.0% .6%		1 100.0% .5%
Column total	161 73.9% 100.0%	57 26.1% 100.0%	218 100.0% 100.0%

TABLE A.48
The condition of the cornea at onset
in mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Cornea R. final Normal cornea	69 56.1% 89.6%	41 33.3% 89.1%	110 89.4% 89.4%
Punctate keratitis	6 4.9% 7.8%	2 1.6% 4.3%	8 6.5% 6.5%
Corneal scarring	2 1.6% 2.6%	3 2.4% 6.5%	5 4.1% 4.1%
Column total	77 62.6% 100.0%	46 37.4% 100.0%	123 100.0% 100.0%

TABLE A.49
Final corneal condition in mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Disc oedema R. No papilloedema	166 74.4% 100.0%	52 23.3% 91.2%	218 97.8% 97.8%
Papilloedema		5 2.2% 8.8%	5 2.2% 2.2%
Column total	166 74.4% 100.0%	57 25.6% 100.0%	223 100.0% 100.0%

TABLE A.50
Disc oedema at onset in mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Choroidal folds R. No choroidal folds	159 74.3% 99.4%	55 25.7% 96.5%	214 100.0% 98.6%
choroidal folds	1 33.3% .6%	2 66.7% 3.5%	3 100.0% 1.4%
Column total	160 73.7% 100.0%	57 26.3% 100.0%	217 100.0% 100.0%

TABLE A.51
Choroidal folds at presentation
in mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Symptom of diplopia No diplopia	103 79.8% 63.6%	26 20.2% 45.6%	129 100.0% 58.9%
Mild diplopia	35 68.6% 21.6%	16 31.4% 28.1%	51 100.0% 23.3%
Moderate diplopia	15 53.6% 9.3%	13 46.4% 22.8%	28 100.0% 12.8%
Severe diplopia	9 81.8% 5.6%	2 18.2% 3.5%	11 100.0% 5.0%
Column total	162 74.0% 100.0%	57 26.0% 100.0%	219 100.0% 100.0%

TABLE A.52
Diplopia as a presenting symptom
in mild and severe ophthalmopathy groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Symptom of diplopia final No diplopia	69 72.6% 87.3%	26 27.4% 59.1%	95 100.0% 77.2%
Mild diplopia	7 29.2% 8.9%	17 70.8% 38.6%	24 100.0% 19.5%
Moderate diplopia	3 100.0% 3.8%		3 100.0% 2.4%
Severe diplopia		1 100.0% 2.3%	1 100.0% .8%
Column total	79 64.2% 100.0%	44 35.8% 100.0%	123 100.0% 100.0%

TABLE A.53
The relation of severity of ophthalmopathy to symptom of diplopia on final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Diplopia on examination No diplopia	88 83.0% 55.7%	18 17.0% 31.6%	106 100.0% 49.3%
Up / down	6 54.5% 3.8%	5 45.5% 8.8%	11 100.0% 5.1%
Add / abd	12 48.0% 7.6%	13 52.0% 22.8%	25 100.0% 11.6%
Close to midline	17 73.9% 10.8%	6 26.1% 10.5%	23 100.0% 10.7%
Extreme gaze	35 70.0% 22.2%	15 30.0% 26.3%	50 100.0% 23.3%
Column total	158 73.5% 100.0%	57 26.5% 100.0%	215 100.0% 100.0%

TABLE A.54
Diplopia elicited on initial examination in relation to mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Diplopia on examination final No diplopia	57 73.1% 74.0%	21 26.9% 50.0%	78 100.0% 65.5%
Up / Down	11 55.0% 14.3%	9 45.0% 21.4%	20 100.0% 16.8%
Add / Abd	2 28.6% 2.6%	5 71.4% 11.9%	7 100.0% 5.9%
Extreme gaze	7 50.0% 9.1%	7 50.0% 16.7%	14 100.0% 11.8%
Column total	77 64.7% 100.0%	42 35.3% 100.0%	119 100.0% 100.0%

TABLE A.55
The relationship between of severity of ophthalmopathy to diplopia elicited on final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Ocular motility R. Normal	82 84.5% 52.9%	15 15.5% 26.8%	97 100.0% 46.0%
R. Up gaze	31 79.5% 20.0%	8 20.5% 14.3%	39 100.0% 18.5%
R. Down gaze	1 33.3% .6%	2 66.7% 3.6%	3 100.0% 1.4%
R. Up & Down	8 80.0% 5.2%	2 20.0% 3.6%	10 100.0% 4.7%
R. Add	1 50.0% .6%	1 50.0% 1.8%	2 100.0% .9%
R. Add & Abd	7 53.8% 4.5%	6 46.2% 10.7%	13 100.0% 6.2%
Combination	25 53.2% 16.1%	22 46.8% 39.3%	47 100.0% 22.3%
Column total	155 73.5% 100.0%	56 26.5% 100.0%	211 100.0% 100.0%

TABLE A.56
Ocular motility (orthoptic assessment)
at onset in mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Ocular motility R. final Normal	50 76.9% 70.4%	15 23.1% 40.5%	65 100.0% 60.2%
R. Up gaze	12 85.7% 16.9%	2 14.3% 5.4%	14 100.0% 13.0%
R. Up & Down	2 33.3% 2.8%	4 66.7% 10.8%	6 100.0% 5.6%
R. Add	1 100.0% 1.4%		1 100.0% .9%
R. Add & Abd		5 100.0% 13.5%	5 100.0% 4.6%
Combination	6 35.3% 8.5%	11 64.7% 29.7%	17 100.0% 15.7%
Column total	71 65.7% 100.0%	37 34.3% 100.0%	108 100.0% 100.0%

TABLE A.57
Orthoptic assessment at final examination for mild and severe ophthalmopathy groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Thyroid status at onset Hyperthyroid	78 75.0% 46.7%	26 25.0% 45.6%	104 100.0% 46.4%
Hypothyroid	51 71.8% 30.5%	20 28.2% 35.1%	71 100.0% 31.7%
Euthyroid	38 77.6% 22.8%	11 22.4% 19.3%	49 100.0% 21.9%
Column total	167 74.6% 100.0%	57 25.4% 100.0%	224 100.0% 100.0%

TABLE A.58
Thyroid status of mild and severe ophthalmopathy groups at onset.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Thyroid status final Hyperthyroid	1 50.0% .6%	1 50.0% 1.8%	2 100.0% .9%
Hypothyroid	69 71.9% 41.6%	27 28.1% 48.2%	96 100.0% 43.2%
Euthyroid	96 77.4% 57.8%	28 22.6% 50.0%	124 100.0% 55.9%
Column total	166 74.8% 100.0%	56 25.2% 100.0%	222 100.0% 100.0%

TABLE A.59
final thyroid status in mild as severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Goitre No goitre	76 70.4% 55.5%	32 29.6% 66.7%	108 100.0% 58.4%
Goitre	61 79.2% 44.5%	16 20.8% 33.3%	77 100.0% 41.6%
Column total	137 74.1% 100.0%	48 25.9% 100.0%	185 100.0% 100.0%

TABLE A.60
Goitre at presentation in relation to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Goitre final No goitre	77 67.5% 88.5%	37 32.5% 90.2%	114 100.0% 89.1%
Goitre	10 71.4% 11.5%	4 28.6% 9.8%	14 100.0% 10.9%
Column total	87 68.0% 100.0%	41 32.0% 100.0%	128 100.0% 100.0%

TABLE A.61
Severity of ophthalmopathy in relation to goitre at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Pretibial dermopathy No pretibial dermopathy	132 73.3% 97.1%	48 26.7% 94.1%	180 100.0% 96.3%
Pretibial dermopathy	4 57.1% 2.9%	3 42.9% 5.9%	7 100.0% 3.7%
Column total	136 72.7% 100.0%	51 27.3% 100.0%	187 100.0% 100.0%

TABLE A.62
Pretibial dermopathy at presentation
in relation to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Pretibial dermopathy final No pretibial dermopathy	89 68.5% 97.8%	41 31.5% 95.3%	130 100.0% 97.0%
Pretibial dermopathy	2 50.0% 2.2%	2 50.0% 4.7%	4 100.0% 3.0%
Column total	91 67.9% 100.0%	43 32.1% 100.0%	134 100.0% 100.0%

TABLE A.63
Severity of ophthalmopathy in relation
to pretibial dermopathy at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Thyroid acropachy			
No thyroid acropachy	135	50	185
	73.0%	27.0%	100.0%
	100.0%	98.0%	99.5%
Thyroid acropachy		1	1
		100.0%	100.0%
		2.0%	.5%
Column total	135	51	186
	72.6%	27.4%	100.0%
	100.0%	100.0%	100.0%

TABLE A.64(a)
The relationship between thyroid acropachy at presentation and the mild and severe groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
thyroid acropachy			
No thyroid acropachy	90	44	134
	67.2%	32.8%	100.0%
	98.9%	97.8%	98.5%
Thyroid acropachy	1	1	2
	50.0%	50.0%	100.0%
	1.1%	2.2%	1.5%
Column total	91	45	136
	66.9%	33.1%	100.0%
	100.0%	100.0%	100.0%

TABLE A.64(b)
The relationship between severity of ophthalmopathy and thyroid acropachy at final assessment.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Myopathy No	136 72.7% 98.6%	51 27.3% 100.0%	187 100.0% 98.9%
Yes	2 100.0% 1.4%		2 100.0% 1.1%
Column total	138 73.0% 100.0%	51 27.0% 100.0%	189 100.0% 100.0%

TABLE A.65
The relationship between thyroid myopathy at onset and the severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Myopathy final No	91 67.4% 100.0%	44 32.6% 97.8%	135 100.0% 99.3%
Yes		1 100.0% 2.2%	1 100.0% .7%
Column total	91 66.9% 100.0%	45 33.1% 100.0%	136 100.0% 100.0%

TABLE A.66
The relationship between thyroid myopathy at final assessment and the severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Cardiac failure No cardiac failure	138 72.3% 97.9%	53 27.7% 98.1%	191 100.0% 97.9%
Cardiac failure	3 75.0% 2.1%	1 25.0% 1.9%	4 100.0% 2.1%
Column total	141 72.3% 100.0%	54 27.7% 100.0%	195 100.0% 100.0%

TABLE A.67
Cardiac failure as the mode of presention of thyroid dysfunction in relarion to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Carbimazole Rx only No	84 75.7% 57.1%	27 24.3% 52.9%	111 100.0% 56.1%
Yes	63 72.4% 42.9%	24 27.6% 47.1%	87 100.0% 43.9%
Column total	147 74.2% 100.0%	51 25.8% 100.0%	198 100.0% 100.0%

TABLE A.68
Carbimazole treatment before onset
in relation to severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Carbimazol Rx only final			
No	90	35	125
	72.0%	28.0%	100.0%
	81.8%	77.8%	80.6%
Yes	20	10	30
	66.7%	33.3%	100.0%
	18.2%	22.2%	19.4%
Column total	110	45	155
	71.0%	29.0%	100.0%
	100.0%	100.0%	100.0%

TABLE A.69
Carbimazole treatment received during the course of ophthalmopathy in relation to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Propranolol Rx			
No	132	40	172
	76.7%	23.3%	100.0%
	89.2%	80.0%	86.9%
Yes	16	10	26
	61.5%	38.5%	100.0%
	10.8%	20.0%	13.1%
Column total	148	50	198
	74.7%	25.3%	100.0%
	100.0%	100.0%	100.0%

TABLE A.70
Propranolol treatment received before onset in relation to the severity of ophthalmopathy.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Propranolol R. final			
No	104	42	146
	71.2%	28.8%	100.0%
	96.3%	87.5%	93.6%
Yes	4	6	10
	40.0%	60.0%	100.0%
	3.7%	12.5%	6.4%
Column total	108	48	156
	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%

TABLE A.71
Propranolol treatment received during the course of ophthalmopathy in relation to the severity of the disease.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
T4 Rx			
No	92	26	118
	78.0%	22.0%	100.0%
	61.3%	52.0%	59.0%
Yes	58	24	82
	70.7%	29.3%	100.0%
	38.7%	48.0%	41.0%
Column total	150	50	200
	75.0%	25.0%	100.0%
	100.0%	100.0%	100.0%

TABLE A.72
Thyroxine treatment received prior to the onset of ophthalmopathy in relation to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
T4 Rx final			
No	41	18	59
	69.5%	30.5%	100.0%
	36.9%	36.7%	36.9%
Yes	70	31	101
	69.3%	30.7%	100.0%
	63.1%	63.3%	63.1%
Column total	111	49	160
	69.4%	30.6%	100.0%
	100.0%	100.0%	100.0%

TABLE A.73
Thyroxine treatment received during the course of opthalmopathy in relation to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
T3 Rx			
No	111	41	152
	73.0%	27.0%	100.0%
	76.0%	82.0%	77.6%
Yes	35	9	44
	79.5%	20.5%	100.0%
	24.0%	18.0%	22.4%
Column total	146	50	196
	74.5%	25.5%	100.0%
	100.0%	100.0%	100.0%

TABLE A.74
Relation of Triiodothyronine treatment received prior to the onset of ophthalmopathy to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
T3 Rx final			
No	103	46	149
	69.1%	30.9%	100.0%
	94.5%	93.9%	94.3%
Yes	6	3	9
	66.7%	33.3%	100.0%
	5.5%	6.1%	5.7%
Column total	109	49	158
	69.0%	31.0%	100.0%
	100.0%	100.0%	100.0%

TABLE A.75
The relationship between Triiodothyronine treatment received during the course of ophthalmopathy to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Radio Iodine Rx			
No	98	28	126
	77.8%	22.2%	100.0%
	64.1%	54.9%	61.8%
Yes	55	23	78
	70.5%	29.5%	100.0%
	35.9%	45.1%	38.2%
Column total	153	51	204
	75.0%	25.0%	100.0%
	100.0%	100.0%	100.0%

TABLE A.76
The relationship between radioiodine received proir to the onset of ophthalmopathy to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Radio Iodine Rx final			
No	47	27	74
	63.5%	36.5%	100.0%
	43.5%	55.1%	47.1%
Yes	61	22	83
	73.5%	26.5%	100.0%
	56.5%	44.9%	52.9%
Column total	108	49	157
	68.8%	31.2%	100.0%
	100.0%	100.0%	100.0%

TABLE A.77
The relationship between radiiodine received during the course of ophthalmopathy to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Partial thyroidectomy			
No	125	41	166
	75.3%	24.7%	100.0%
	81.2%	78.8%	80.6%
Yes	29	11	40
	72.5%	27.5%	100.0%
	18.8%	21.2%	19.4%
Column total	154	52	206
	74.8%	25.2%	100.0%
	100.0%	100.0%	100.0%

TABLE A.78
The effect of partial thyroidectomy proir to the onset of ophthalmopathy on its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Partial thyroidectomy final			
No	90	42	132
	68.2%	31.8%	100.0%
	81.8%	85.7%	83.0%
Yes	20	7	27
	74.1%	25.9%	100.0%
	18.2%	14.3%	17.0%
Column total	110	49	159
	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%

TABLE A.79
Partial thyroidectomy performed during the course of of ophthalmopathy in relation to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Diabetes			
No	148	53	201
	73.6%	26.4%	100.0%
	96.1%	96.4%	96.2%
Yes	6	2	8
	75.0%	25.0%	100.0%
	3.9%	3.6%	3.8%
Column total	154	55	209
	73.7%	26.3%	100.0%
	100.0%	100.0%	100.0%

TABLE A.80
The relationship between diabetes at the onset of ophthalmopathy to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Diabetes final No	113 69.3% 97.4%	50 30.7% 96.2%	163 100.0% 97.0%
Yes	3 60.0% 2.6%	2 40.0% 3.8%	5 100.0% 3.0%
Column total	116 69.0% 100.0%	52 31.0% 100.0%	168 100.0% 100.0%

TABLE A.81
The relationship between diabetes at final assesment and the mild and severe ophthalmopathy groups.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Hypertension No	136 74.3% 90.1%	47 25.7% 88.7%	183 100.0% 89.7%
Yes	15 71.4% 9.9%	6 28.6% 11.3%	21 100.0% 10.3%
Column total	151 74.0% 100.0%	53 26.0% 100.0%	204 100.0% 100.0%

TABLE A.82
Hypertension prior to the onset of ophthalmopathy in relation to its severity.

Mild and severe groups

	Severity of Disease Rt.		Row total
	mild	severe	
Hypertension final No	105 69.5% 90.5%	46 30.5% 88.5%	151 100.0% 89.9%
Yes	11 64.7% 9.5%	6 35.3% 11.5%	17 100.0% 10.1%
Column total	116 69.0% 100.0%	52 31.0% 100.0%	168 100.0% 100.0%

TABLE A.83
The relation of hypertension at final assessment to the severity of ophthalmopathy.

Severe group

	Systemic steroids		Row total
	No	Yes	
Decompression R. Steroids only		19 100.0% 48.7%	19 100.0% 33.3%
Surgical decompression	18 47.4% 100.0%	20 52.6% 51.3%	38 100.0% 66.7%
Column total	18 31.6% 100.0%	39 68.4% 100.0%	57 100.0% 100.0%

TABLE A.84
The relationship of treatment either with systemic steroids or orbital decompression in the severe group.

Severe Ophthalmopathy Group

	Decompression R.					
	Steroids only			Surgical decompression		
	Patient age			Patient age		
	Mean age	Count	Percent	Mean age	Count	Percent
Patient sex						
Male	52.5	8	42.1%	54.1	8	21.1%
Female	45.5	11	57.9%	46.0	30	78.9%
Column total	48.5	19	100.0%	47.7	38	100.0%

TABLE A.85
The mean age (in years) of males and females in steroids and decompression subgroups.

Severe Ophthalmopathy Group

	Decompression R.					
	Steroids only			Surgical decompression		
	Duration of thyroid dysfunction			Duration of thyroid dysfunction		
	Mean duration	Count	Percent	Mean duration	Count	Percent
Patient sex						
Male	17.6	8	42.1%	35.9	8	21.1%
Female	28.7	11	57.9%	59.7	30	78.9%
Column total	24.1	19	100.0%	54.7	38	100.0%

TABLE A.86
The mean duration (in months) from the time of diagnosis of thyroid dysfunction to the onset of ophthalmopathy in males and females in subgroups treated with steroids or decompression.

Severe Ophthalmopathy Group

	Decompression R.					
	Steroids only			Surgical decompression		
	Follow-up peroid in years			Follow-up peroid in years		
	Mean followup	Count	Percent	Mean followup	Count	Percent
Patient sex						
Male	9.8	8	42.1%	6.6	8	21.1%
Female	10.2	11	57.9%	10.3	30	78.9%
Column total	10.0	19	100.0%	9.5	38	100.0%

TABLE A.87
Follow-up peroid (in years) of males and females in subgroups treated with steroids or with surgical orbital decompression.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Visual acuity 6/60		1 100.0% 2.8%	1 100.0% 1.9%
6/36		1 100.0% 2.8%	1 100.0% 1.9%
6/18	2 33.3% 11.1%	4 66.7% 11.1%	6 100.0% 11.1%
6/12	2 40.0% 11.1%	3 60.0% 8.3%	5 100.0% 9.3%
6/9	3 25.0% 16.7%	9 75.0% 25.0%	12 100.0% 22.2%
6/6	5 29.4% 27.8%	12 70.6% 33.3%	17 100.0% 31.5%
6/5	5 55.6% 27.8%	4 44.4% 11.1%	9 100.0% 16.7%
6/4	1 33.3% 5.6%	2 66.7% 5.6%	3 100.0% 5.6%
Column total	18	36	54

TABLE A.88
Visual acuity distribution at presentation in subgroups treated with steroids or decompression

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Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
	33.3% 100.0%	66.7% 100.0%	100.0% 100.0%

TABLE A.88
Visual acuity distribution at presentation in subgroups treated with steroids or decompression

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Visual acuity R. final NPL	1 100.0% 6.7%		1 100.0% 2.0%
HM	1 100.0% 6.7%		1 100.0% 2.0%
3/60		1 100.0% 2.9%	1 100.0% 2.0%
4/60		1 100.0% 2.9%	1 100.0% 2.0%
6/36		2 100.0% 5.9%	2 100.0% 4.1%
6/18		2 100.0% 5.9%	2 100.0% 4.1%
6/12	2 22.2% 13.3%	7 77.8% 20.6%	9 100.0% 18.4%
6/9		10 100.0% 29.4%	10 100.0% 20.4%
6/6	8	8	16

TABLE A.89
Visual acuity distribution at final assessment in subgroups treated with steroids or decompression.

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Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
	50.0% 53.3%	50.0% 23.5%	100.0% 32.7%
6/5	3 50.0% 20.0%	3 50.0% 8.8%	6 100.0% 12.2%
Column total	15 30.6% 100.0%	34 69.4% 100.0%	49 100.0% 100.0%

TABLE A.89
Visual acuity distribution at final assessment in subgroups treated with steroids or decompression.

Severe group

	Lid Lag R.		Row total
	No lid lag	Lid lag	
Decompression R. Steroids only	1 5.6% 100.0%	17 94.4% 34.0%	18 100.0% 35.3%
Surgical decompression		33 100.0% 66.0%	33 100.0% 64.7%
Column total	1 2.0% 100.0%	50 98.0% 100.0%	51 100.0% 100.0%

TABLE A.90
Lid lag at presentation in the steroid and decompression subgroups.

Severe group

	Lid lag R. final		Row total
	No lid lag	Lid lag	
Decompression R. Steroids only	3 30.0% 33.3%	7 70.0% 26.9%	10 100.0% 28.6%
Surgical decompression	6 24.0% 66.7%	19 76.0% 73.1%	25 100.0% 71.4%
Column total	9 25.7% 100.0%	26 74.3% 100.0%	35 100.0% 100.0%

TABLE A.91
Lid lag at final assessment of the steroids and decompression subgroups.

Severe group

	Lid retraction R.		Row total
	No lid retraction	Lid retraction	
Decompression R. Steroids only	1 5.6% 100.0%	17 94.4% 32.7%	18 100.0% 34.0%
Surgical decompression		35 100.0% 67.3%	35 100.0% 66.0%
Column total	1 1.9% 100.0%	52 98.1% 100.0%	53 100.0% 100.0%

TABLE A.92
Lid retraction of the steroid and decompression subgroups at presentation.

Severe group

	Lid retraction R. final		Row total
	No lid retraction	Lid retraction	
Decompression R. Steroids only	2 20.0% 25.0%	8 80.0% 29.6%	10 100.0% 28.6%
Surgical decompression	6 24.0% 75.0%	19 76.0% 70.4%	25 100.0% 71.4%
Column total	8 22.9% 100.0%	27 77.1% 100.0%	35 100.0% 100.0%

TABLE A.93
Lid retraction of the steroids and decompression subgroups at final assessment.

	Lid Lag R.		Row total
	No lid lag	Lid lag	
Cornea R. Normal cornea		36 100.0% 72.0%	36 100.0% 70.6%
Punctate keratitis	1 8.3% 100.0%	11 91.7% 22.0%	12 100.0% 23.5%
Corneal ulceration		3 100.0% 6.0%	3 100.0% 5.9%
Column total	1 2.0% 100.0%	50 98.0% 100.0%	51 100.0% 100.0%

TABLE A.94
The relationship between lid lag and the condition of the cornea at presentation in the severe group.

	Lid lag R. final		Row total
	No lid lag	Lid lag	
Cornea R. final Normal cornea	8 26.7% 88.9%	22 73.3% 84.6%	30 100.0% 85.7%
Punctate keratitis		2 100.0% 7.7%	2 100.0% 5.7%
Corneal scarring	1 33.3% 11.1%	2 66.7% 7.7%	3 100.0% 8.6%
Column total	9 25.7% 100.0%	26 74.3% 100.0%	35 100.0% 100.0%

TABLE A.96
The relationship between lid lag and the condition of the cornea at final assessment in the severe group.

	Lid retraction R.		Row total
	No lid retraction	Lid retraction	
Cornea R. Normal cornea	1 2.6% 100.0%	37 97.4% 71.2%	38 100.0% 71.7%
Punctate keratitis		12 100.0% 23.1%	12 100.0% 22.6%
Corneal ulceration		3 100.0% 5.8%	3 100.0% 5.7%
Column total	1 1.9% 100.0%	52 98.1% 100.0%	53 100.0% 100.0%

TABLE A.97
The relationship between lid retraction and corneal condition at onset in the severe group.

	Lid retraction R. final		Row total
	No lid retraction	Lid retraction	
Cornea R. final Normal cornea	7 23.3% 87.5%	23 76.7% 85.2%	30 100.0% 85.7%
Punctate keratitis		2 100.0% 7.4%	2 100.0% 5.7%
Corneal scarring	1 33.3% 12.5%	2 66.7% 7.4%	3 100.0% 8.6%
Column total	8 22.9% 100.0%	27 77.1% 100.0%	35 100.0% 100.0%

TABLE A.98
The relationship between lid retraction and corneal condition at final assessment in the severe group.

	Lid oedema R.		Row total
	No lid oedema	Lid oedema	
Decompression R. Steroids only	9 50.0% 42.9%	9 50.0% 30.0%	18 100.0% 35.3%
Surgical decompression	12 36.4% 57.1%	21 63.6% 70.0%	33 100.0% 64.7%
Column total	21 41.2% 100.0%	30 58.8% 100.0%	51 100.0% 100.0%

TABLE A.99
The relationship between lid oedema at onset and different treatment subgroups.

	Lid oedema R. final		Row total
	No lid oedema	Lid oedema	
Decompression R. Steroids only	9 90.0% 26.5%	1 10.0% 25.0%	10 100.0% 26.3%
Surgical decompression	25 89.3% 73.5%	3 10.7% 75.0%	28 100.0% 73.7%
Column total	34 89.5% 100.0%	4 10.5% 100.0%	38 100.0% 100.0%

TABLE A.100
Lid oedema at final assessment in cases treated with steroids or decompression.

Severe group

	Chemosis R.		Row total
	No Chemosis	Chemosis	
Decompression R. Steroids only	13 72.2% 39.4%	5 27.8% 27.8%	18 100.0% 35.3%
Surgical decompression	20 60.6% 60.6%	13 39.4% 72.2%	33 100.0% 64.7%
Column total	33 64.7% 100.0%	18 35.3% 100.0%	51 100.0% 100.0%

TABLE A.101
The relationship between chemosis at persentation and the steroid and decompression subgroups.

Severe group

	Chemosis R. final		Row total
	No Chemosis	Chemosis	
Decompression R. Steroids only	10 100.0% 28.6%		10 100.0% 27.8%
Surgical decompression	25 96.2% 71.4%	1 3.8% 100.0%	26 100.0% 72.2%
Column total	35 97.2% 100.0%	1 2.8% 100.0%	36 100.0% 100.0%

TABLE A.102
Chemosis at final assessment in steroid and decompression subgroups.

Severe group

	Cornea R.			Row total
	Normal cornea	Punctate keratitis	Corneal ulceration	
Decompression R. Steroids only	13 68.4% 31.0%	4 21.1% 33.3%	2 10.5% 66.7%	19 100.0% 33.3%
Surgical decompression	29 76.3% 69.0%	8 21.1% 66.7%	1 2.6% 33.3%	38 100.0% 66.7%
Column total	42 73.7% 100.0%	12 21.1% 100.0%	3 5.3% 100.0%	57 100.0% 100.0%

TABLE A.103
Corneal condition at presentation of both steroid and decompression treated subgroups.

	Cornea R. final			Row total
	Normal cornea	Punctate keratitis	Corneal scarring	
Decompression R. Steroids only	12 92.3% 29.3%		1 7.7% 33.3%	13 100.0% 28.3%
Surgical decompression	29 87.9% 70.7%	2 6.1% 100.0%	2 6.1% 66.7%	33 100.0% 71.7%
Column total	41 89.1% 100.0%	2 4.3% 100.0%	3 6.5% 100.0%	46 100.0% 100.0%

TABLE A.104
Corneal condition at final assessment in relation to steroid and decompression subgroups.

Severe group

	Disc oedema R.		Row total
	No papilloedema	Papilloedema	
Decompression R. Steroids only	17 89.5% 32.7%	2 10.5% 40.0%	19 100.0% 33.3%
Surgical decompression	35 92.1% 67.3%	3 7.9% 60.0%	38 100.0% 66.7%
Column total	52 91.2% 100.0%	5 8.8% 100.0%	57 100.0% 100.0%

TABLE A.105
The relation between presentation with disc oedema and the final treatment subgroup.

Severe group

	Choroidal folds R.		Row total
	No choroidal folds	choroidal folds	
Decompression R. Steroids only	19 100.0% 34.5%		19 100.0% 33.3%
Surgical decompression	36 94.7% 65.5%	2 5.3% 100.0%	38 100.0% 66.7%
Column total	55 96.5% 100.0%	2 3.5% 100.0%	57 100.0% 100.0%

TABLE A.106
Choroidal folds at presentation in steroid and decomression treatment subgroups.

Severe group

	Symptom of diplopia				Row total
	No diplopia	Mild diplopia	Moderate diplopia	Severe diplopia	
Decompression R. Steroids only	6 31.6% 23.1%	6 31.6% 37.5%	6 31.6% 46.2%	1 5.3% 50.0%	19 100.0% 33.3%
Surgical decompression	20 52.6% 76.9%	10 26.3% 62.5%	7 18.4% 53.8%	1 2.6% 50.0%	38 100.0% 66.7%
Column total	26 45.6% 100.0%	16 28.1% 100.0%	13 22.8% 100.0%	2 3.5% 100.0%	57 100.0% 100.0%

TABLE A.107
Diplopia at presentation in steroid and decompression subgroups.

Severe group

	Symptom of diplopia final			Row total
	No diplopia	Mild diplopia	Severe diplopia	
Decompression R. Steroids only	9 75.0% 34.6%	3 25.0% 17.6%		12 100.0% 27.3%
Surgical decompression	17 53.1% 65.4%	14 43.8% 82.4%	1 3.1% 100.0%	32 100.0% 72.7%
Column total	26 59.1% 100.0%	17 38.6% 100.0%	1 2.3% 100.0%	44 100.0% 100.0%

TABLE A.108
Diplopia at final assessment in steroid and decompression subgroups.

Severe group

	Decompression R.	
	Steroids only	Surgical decompression
IOP straight R.		
Mean IOP st.	17.3	19.8
Standard Deviation	4	4
Variance	15	20
Maximum	25	35
Minimum	11	12
Count	19	38

TABLE A.109
Mean intraocualr pressure at presentation in steroid and decompression subgroups.

Severe Ophthalmopathy Group

	Decompression R.	
	Steroids only	Surgical decompression
IOP straight R. final		
Mean IOP st.	17.1	15.9
Standard Deviation	3	3
Variance	10	8
Maximum	22	22
Minimum	12	10
Count	19	38

TABLE A.110
Mean intraocular pressure at finalassessment in steroid and decompression subgroups.

Severe group

	Decompression R.	
	Steroids only	Surgical decompression
IOP up R.		
Mean IOP st.	22.5	26.5
Standard Deviation	7	5
Variance	44	23
Maximum	30	34
Minimum	16	18
Count	19	38

TABLE A.111
Mean intraocualr pressure on up gaze at presentation in the mild and severe groups.

Severe Ophthalmopathy Group

	Decompression R.	
	Steroids only	Surgical decompression
IOP up R. final		
Mean IOP st.	20.5	18.6
Standard Deviation	4	4
Variance	14	12
Maximum	25	25
Minimum	16	16
Count	19	38

TABLE A.112
final intraocular pressure in upgaze for steroid and decompression subgroups.

Severe group

	Decompression R.	
	Steroids only	Surgical decompression
Exophthalmos R.		
Mean Exophthalmos	20.8	23.6
Standard Deviation	4	4
Variance	13	13
Maximum	28	30
Minimum	15	17
Count	19	38

TABLE A.113
Exophthalmometry (in mm.) at presentation in steroid and decompression subgroups.

Severe Ophthalmopathy Group

	Decompression R.	
	Steroids only	Surgical decompression
Exophthalmos R. final		
Mean Exophthalmos	20.0	20.8
Standard Deviation	4	4
Variance	15	16
Maximum	25	29
Minimum	13	15
Count	19	38

TABLE A.114
Exophthalmometry (in mm.) at final assessment in steroid and decompression subgroups.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Tarsorrhaphy R. No	14 32.6% 87.5%	29 67.4% 87.9%	43 100.0% 87.8%
Yes	2 33.3% 12.5%	4 66.7% 12.1%	6 100.0% 12.2%
Column total	16 32.7% 100.0%	33 67.3% 100.0%	49 100.0% 100.0%

TABLE A.115
Cases required tarsorrhaphy in
steroid and decompression subgroups.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Muscle surgery R. No	14 40.0% 77.8%	21 60.0% 55.3%	35 100.0% 62.5%
Yes	4 19.0% 22.2%	17 81.0% 44.7%	21 100.0% 37.5%
Column total	18 32.1% 100.0%	38 67.9% 100.0%	56 100.0% 100.0%

TABLE A.116
The relationship between extraocular muscle surgery and the treatment subgroup.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Guanethidine No	11 31.4% 61.1%	24 68.6% 63.2%	35 100.0% 62.5%
Yes	7 33.3% 38.9%	14 66.7% 36.8%	21 100.0% 37.5%
Column total	18 32.1% 100.0%	38 67.9% 100.0%	56 100.0% 100.0%

TABLE A.117
The relationship between treatment with Guanethidine and the steroid and decompression subgroups.

Severe group

	Goitre		Row total
	No goitre	Goitre	
Decompression R. Steroids only	8 57.1% 25.0%	6 42.9% 37.5%	14 100.0% 29.2%
Surgical decompression	24 70.6% 75.0%	10 29.4% 62.5%	34 100.0% 70.8%
Column total	32 66.7% 100.0%	16 33.3% 100.0%	48 100.0% 100.0%

TABLE A.118
The presence of Goitre at presentation in relation to steroid and surgical decompression subgroups.

Severe group

	Goitre final		Row total
	No goitre	Goitre	
Decompression R. Steroids only	11 91.7% 29.7%	1 8.3% 25.0%	12 100.0% 29.3%
Surgical decompression	26 89.7% 70.3%	3 10.3% 75.0%	29 100.0% 70.7%
Column total	37 90.2% 100.0%	4 9.8% 100.0%	41 100.0% 100.0%

TABLE A.119
The presence of Goitre at final assessment in relation to steroid and the surgical decompression subgroups.

Severe group

	Carbimazole Rx only		Row total
	No	Yes	
Decompression R. Steroids only	7 43.8% 25.9%	9 56.3% 37.5%	16 100.0% 31.4%
Surgical decompression	20 57.1% 74.1%	15 42.9% 62.5%	35 100.0% 68.6%
Column total	27 52.9% 100.0%	24 47.1% 100.0%	51 100.0% 100.0%

TABLE A.120
The relationship of treatment with Carbimazole and the steroid and decompression subgroups.

Severe group

	Carbimazol Rx only final		Row total
	No	Yes	
Decompression R. Steroids only	10 76.9% 28.6%	3 23.1% 30.0%	13 100.0% 28.9%
Surgical decompression	25 78.1% 71.4%	7 21.9% 70.0%	32 100.0% 71.1%
Column total	35 77.8% 100.0%	10 22.2% 100.0%	45 100.0% 100.0%

TABLE A.121
The distribution of patients who received Carbimazole during the course of ophthalmopathy in the steroid and orbital surgical decompression groups.

Severe group

	Propranolol Rx		Row total
	No	Yes	
Decompression R. Steroids only	13 81.3% 32.5%	3 18.8% 30.0%	16 100.0% 32.0%
Surgical decompression	27 79.4% 67.5%	7 20.6% 70.0%	34 100.0% 68.0%
Column total	40 80.0% 100.0%	10 20.0% 100.0%	50 100.0% 100.0%

TABLE A.122
The relationship between Propranolol treatment and the steroid and decompression subgroups.

Severe group

	Propranolol R. final		Row total
	No	Yes	
Decompression R. Steroids only	11 78.6% 26.2%	3 21.4% 50.0%	14 100.0% 29.2%
Surgical decompression	31 91.2% 73.8%	3 8.8% 50.0%	34 100.0% 70.8%
Column total	42 87.5% 100.0%	6 12.5% 100.0%	48 100.0% 100.0%

TABLE A.123
The relationship between treatment with Propranolol during the course of disease and the steroid or orbital surgical decompression subgroups.

Severe groups

	T4 Rx		Row total
	No	Yes	
Decompression R. Steroids only	10 62.5% 38.5%	6 37.5% 25.0%	16 100.0% 32.0%
Surgical decompression	16 47.1% 61.5%	18 52.9% 75.0%	34 100.0% 68.0%
Column total	26 52.0% 100.0%	24 48.0% 100.0%	50 100.0% 100.0%

TABLE A.124
The relationship between Thyroxine treatment and the steroid and decompression subgroups.

Severe group

	T4 Rx final		Row total
	No	Yes	
Decompression R. Steroids only	4 26.7% 22.2%	11 73.3% 35.5%	15 100.0% 30.6%
Surgical decompression	14 41.2% 77.8%	20 58.8% 64.5%	34 100.0% 69.4%
Column total	18 36.7% 100.0%	31 63.3% 100.0%	49 100.0% 100.0%

TABLE A.125
The distribution of patients who were receiving Thyroxine at final assessment in the steroid and decompression subgroups.

Severe group

	T3 Rx		Row total
	No	Yes	
Decompression R. Steroids only	10 62.5% 24.4%	6 37.5% 66.7%	16 100.0% 32.0%
Surgical decompression	31 91.2% 75.6%	3 8.8% 33.3%	34 100.0% 68.0%
Column total	41 82.0% 100.0%	9 18.0% 100.0%	50 100.0% 100.0%

TABLE A.126
The relationship between Triiodothyronine treatment before the onset of ophthalmopathy and the steroid and orbital surgical decompression subgroups.

Severe group

	T3 Rx final		Row total
	No	Yes	
Decompression R. Steroids only	14 93.3% 30.4%	1 6.7% 33.3%	15 100.0% 30.6%
Surgical decompression	32 94.1% 69.6%	2 5.9% 66.7%	34 100.0% 69.4%
Column total	46 93.9% 100.0%	3 6.1% 100.0%	49 100.0% 100.0%

TABLE A.127
The relationship between Triiodothyronine treatment during the course of ophthalmopathy and the steroid and orbital surgical decompression subgroups.

Severe group

	Radio Iodine Rx		Row total
	No	Yes	
Decompression R. Steroids only	9 56.3% 32.1%	7 43.8% 30.4%	16 100.0% 31.4%
Surgical decompression	19 54.3% 67.9%	16 45.7% 69.6%	35 100.0% 68.6%
Column total	28 54.9% 100.0%	23 45.1% 100.0%	51 100.0% 100.0%

TABLE A.128
The effect of radioiodine treatment received before the onset of ophthalmopahty on the final treatment modality in the severe group.

Severe group

	Radio Iodine Rx final		Row total
	No	Yes	
Decompression R. Steroids only	7 46.7% 25.9%	8 53.3% 36.4%	15 100.0% 30.6%
Surgical decompression	20 58.8% 74.1%	14 41.2% 63.6%	34 100.0% 69.4%
Column total	27 55.1% 100.0%	22 44.9% 100.0%	49 100.0% 100.0%

TABLE A.129
The relationship of radio-iodine treatment during the course of ophthalmopathy and the choice of steroids or decompression for treatment.

Severe group

	Partial thyroidectomy		Row total
	No	Yes	
Decompression R. Steroids only	13 81.3% 31.7%	3 18.8% 27.3%	16 100.0% 30.8%
Surgical decompression	28 77.8% 68.3%	8 22.2% 72.7%	36 100.0% 69.2%
Column total	41 78.8% 100.0%	11 21.2% 100.0%	52 100.0% 100.0%

TABLE A.130
The effect of partial thyroidectomy prior to the onset of ophthalmopathy on the choice of treatment subgroup.

Severe group

	Partial thyroidectomy final		Row total
	No	Yes	
Decompression R. Steroids only	13 86.7% 31.0%	2 13.3% 28.6%	15 100.0% 30.6%
Surgical decompression	29 85.3% 69.0%	5 14.7% 71.4%	34 100.0% 69.4%
Column total	42 85.7% 100.0%	7 14.3% 100.0%	49 100.0% 100.0%

TABLE A.131
The relationship of partial thyroidectomy performed during the course of ophthalmopathy to the choice of treatment subgroup.

Severe group

	Diabetes		Row total
	No	Yes	
Decompression R. Steroids only	16 88.9% 30.2%	2 11.1% 100.0%	18 100.0% 32.7%
Surgical decompression	37 100.0% 69.8%		37 100.0% 67.3%
Column total	53 96.4% 100.0%	2 3.6% 100.0%	55 100.0% 100.0%

TABLE A.132
Diabetes in the steroid and decompression subgroups.

Severe group

	Diabetes final		Row total
	No	Yes	
Decompression R. Steroids only	14 87.5% 28.0%	2 12.5% 100.0%	16 100.0% 30.8%
Surgical decompression	36 100.0% 72.0%		36 100.0% 69.2%
Column total	50 96.2% 100.0%	2 3.8% 100.0%	52 100.0% 100.0%

TABLE A.133
Diabetes on final assessment in relation to steroid and decompression treatment subgroups.

Severe group

	Hypertension		Row total
	No	Yes	
Decompression R. Steroids only	15 88.2% 31.9%	2 11.8% 33.3%	17 100.0% 32.1%
Surgical decompression	32 88.9% 68.1%	4 11.1% 66.7%	36 100.0% 67.9%
Column total	47 88.7% 100.0%	6 11.3% 100.0%	53 100.0% 100.0%

TABLE A.134
Hypertension at onset in relation to the steroid and decompression subgroups.

Severe group

	Hypertension final		Row total
	No	Yes	
Decompression R. Steroids only	13 81.3% 28.3%	3 18.8% 50.0%	16 100.0% 30.8%
Surgical decompression	33 91.7% 71.7%	3 8.3% 50.0%	36 100.0% 69.2%
Column total	46 88.5% 100.0%	6 11.5% 100.0%	52 100.0% 100.0%

TABLE A.135
Hypertension at final assessment in relation to the steroid and decompression subgroups

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Diplopia on examination No diplopia	4 22.2% 21.1%	14 77.8% 36.8%	18 100.0% 31.6%
Up / down	2 40.0% 10.5%	3 60.0% 7.9%	5 100.0% 8.8%
Add / abd	4 30.8% 21.1%	9 69.2% 23.7%	13 100.0% 22.8%
Close to midline	4 66.7% 21.1%	2 33.3% 5.3%	6 100.0% 10.5%
Extreme gaze	5 33.3% 26.3%	10 66.7% 26.3%	15 100.0% 26.3%
Column total	19 33.3% 100.0%	38 66.7% 100.0%	57 100.0% 100.0%

TABLE A.136
The relationship between persentation with diplopia and the treatment category in the severe group.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Diplopia on examination final No diplopia	9 42.9% 75.0%	12 57.1% 40.0%	21 100.0% 50.0%
Up / Down	1 11.1% 8.3%	8 88.9% 26.7%	9 100.0% 21.4%
Add / Abd	1 20.0% 8.3%	4 80.0% 13.3%	5 100.0% 11.9%
Extreme gaze	1 14.3% 8.3%	6 85.7% 20.0%	7 100.0% 16.7%
Column total	12 28.6% 100.0%	30 71.4% 100.0%	42 100.0% 100.0%

TABLE A.137
The relationship between treatment modality and diplopia at final assessment in the severe group.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Ocular motility R. Normal	3 20.0% 15.8%	12 80.0% 32.4%	15 100.0% 26.8%
R. Up gaze	3 37.5% 15.8%	5 62.5% 13.5%	8 100.0% 14.3%
R. Down gaze	1 50.0% 5.3%	1 50.0% 2.7%	2 100.0% 3.6%
R. Up & Down	2 100.0% 10.5%		2 100.0% 3.6%
R. Add		1 100.0% 2.7%	1 100.0% 1.8%
R. Add & Abd	3 50.0% 15.8%	3 50.0% 8.1%	6 100.0% 10.7%
Combination	7 31.8% 36.8%	15 68.2% 40.5%	22 100.0% 39.3%
Column total	19 33.9% 100.0%	37 66.1% 100.0%	56 100.0% 100.0%

TABLE A.138
The relationship between persentation with ocular muscle dysfunction and the treatment category in the severe group.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Ocular motility R. final Normal	5 33.3% 50.0%	10 66.7% 37.0%	15 100.0% 40.5%
R. Up gaze	1 50.0% 10.0%	1 50.0% 3.7%	2 100.0% 5.4%
R. Up & Down		4 100.0% 14.8%	4 100.0% 10.8%
R. Add & Abd	2 40.0% 20.0%	3 60.0% 11.1%	5 100.0% 13.5%
Combination	2 18.2% 20.0%	9 81.8% 33.3%	11 100.0% 29.7%
Column total	10 27.0% 100.0%	27 73.0% 100.0%	37 100.0% 100.0%

TABLE A.139
The relationship between treatment modality and extraocular muscle dysfunction at final assessment.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Thyroid status at onset Hyperthyroid	9 34.6% 47.4%	17 65.4% 44.7%	26 100.0% 45.6%
Hypothyroid	7 35.0% 36.8%	13 65.0% 34.2%	20 100.0% 35.1%
Euthyroid	3 27.3% 15.8%	8 72.7% 21.1%	11 100.0% 19.3%
Column total	19 33.3% 100.0%	38 66.7% 100.0%	57 100.0% 100.0%

TABLE A.140
The relationship between of thyroid status at onset and the treatment subgroup.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Thyroid status final Hyperthyroid	1 100.0% 5.3%		1 100.0% 1.8%
Hypothyroid	11 40.7% 57.9%	16 59.3% 43.2%	27 100.0% 48.2%
Euthyroid	7 25.0% 36.8%	21 75.0% 56.8%	28 100.0% 50.0%
Column total	19 33.9% 100.0%	37 66.1% 100.0%	56 100.0% 100.0%

TABLE A.141
The relationship between thyroid status at final assessment and the treatment subgroup.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Pretibial dermopathy No pretibial dermopathy	15 31.3% 93.8%	33 68.8% 94.3%	48 100.0% 94.1%
Pretibial dermopathy	1 33.3% 6.3%	2 66.7% 5.7%	3 100.0% 5.9%
Column total	16 31.4% 100.0%	35 68.6% 100.0%	51 100.0% 100.0%

TABLE A.142
The relationship between pretibial dermopathy at presentation and the treatment subgroup.

Severe group

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Pretibial dermopathy final No pretibial dermopathy	13 31.7% 100.0%	28 68.3% 93.3%	41 100.0% 95.3%
Pretibial dermopathy		2 100.0% 6.7%	2 100.0% 4.7%
Column total	13 30.2% 100.0%	30 69.8% 100.0%	43 100.0% 100.0%

TABLE A.143
The relationship between pretibial dermopathy at final assessment and the treatment subgroup.

Muscle surgery

	Decompression R.		Row total
	No	Yes	
Muscle surgery R. No	143 87.2% 89.9%	21 12.8% 55.3%	164 100.0% 83.2%
Yes	16 48.5% 10.1%	17 51.5% 44.7%	33 100.0% 16.8%
Column total	159 80.7% 100.0%	38 19.3% 100.0%	197 100.0% 100.0%

TABLE A.144
The relationship between extraocular muscle surgery and orbital decompression.

Optic neuropathy

	Reason for decompression		Row total
	ON	ON+COR	
Signs of optic neuropathy FLD	3 100.0% 13.6%		3 100.0% 12.0%
CLR	1 100.0% 4.5%		1 100.0% 4.0%
VA	4 100.0% 18.2%		4 100.0% 16.0%
D.ED	3 75.0% 13.6%	1 25.0% 33.3%	4 100.0% 16.0%
FLD+CLR	7 87.5% 31.8%	1 12.5% 33.3%	8 100.0% 32.0%
FLD+VA		1 100.0% 33.3%	1 100.0% 4.0%
FLD+CLR+VA	2 100.0% 9.1%		2 100.0% 8.0%
FLD+CLR+D.ED	1 100.0% 4.5%		1 100.0% 4.0%
FLD+CLR+VA+D.ED	1		1

TABLE A.145
The relationship between the indications for decompression and the diagnostic signs of optic neuropathy.

(continue

Optic neuropathy

	Reason for decompression		Row total
	ON	ON+COR	
	100.0% 4.5%		100.0% 4.0%
Column total	22 88.0% 100.0%	3 12.0% 100.0%	25 100.0% 100.0%

TABLE A.145
The relationship between the indications for decompression and the diagnostic signs of optic neuropathy.

	Decompression R.		Row total
	Steroids only	Surgical decompression	
Signs of optic neuropathy FLD	1 33.3% 14.3%	2 66.7% 11.1%	3 100.0% 12.0%
CLR		1 100.0% 5.6%	1 100.0% 4.0%
VA	1 25.0% 14.3%	3 75.0% 16.7%	4 100.0% 16.0%
D.ED	1 25.0% 14.3%	3 75.0% 16.7%	4 100.0% 16.0%
FLD+CLR	2 25.0% 28.6%	6 75.0% 33.3%	8 100.0% 32.0%
FLD+VA		1 100.0% 5.6%	1 100.0% 4.0%
FLD+CLR+VA	1 50.0% 14.3%	1 50.0% 5.6%	2 100.0% 8.0%
FLD+CLR+D.ED		1 100.0% 5.6%	1 100.0% 4.0%
FLD+CLR+VA+D.ED	1		1

TABLE A.145a
The method of diagnosis of optic neuropathy in subgroups treated with steroids or decompression.

(continue

	Decompression R.		Row total
	Steroids only	Surgical decompression	
	100.0% 14.3%		100.0% 4.0%
Column total	7 28.0% 100.0%	18 72.0% 100.0%	25 100.0% 100.0%

TABLE A.145a
The method of diagnosis of optic neuropathy
in subgroups treated with steroids or decompression.

Orbital decompression Rt.

	Patient age		
	Mean age	Count	Count Percent
Patient sex			
Male	54.1	8	21.1%
Female	46.0	30	78.9%
Column total	47.7	38	100.0%

TABLE A.146
Mean age (in years) of males and females in the decompression subgroup.

Orbital decompression

	Duration of thyroid dysfunction		
	Mean duration	Count	Count Percent
Patient sex			
Male	35.9	8	21.1%
Female	59.7	30	78.9%
Column total	54.7	38	100.0%

TABLE A. 147
Mean duration (in months) from the time of disgnosis of of thyroid dysfunction to the onset of ophthalmopathy in males and females in the decompression subgroup.

Orbital decompression

	Follow-up peroid in years		
	Mean followup	Count	Count Percent
Patient sex			
Male	6.6	8	21.1%
Female	10.3	30	78.9%
Column total	9.5	38	100.0%

TABLE A.148
Mean follow-up peroid (in years) for females and males in the decompression subgroup.

Orbital decompression

	Decompression R.
	Surgical decompression
Visual acuity 6/60 Count	1 2.8%
6/36 Count	1 2.8%
6/18 Count	4 11.1%
6/12 Count	3 8.3%
6/9 Count	9 25.0%
6/6 Count	12 33.3%
6/5 Count	4 11.1%
6/4 Count	2 5.6%
Column total Count	36

TABLE A.149
Distribution of visual acuity levels in the decompression subgroup.

Orbital decompression

	Decompression R.
	Surgical decompression
Visual acuity R. final 3/60 Count	1 2.9%
4/60 Count	1 2.9%
6/36 Count	2 5.9%
6/18 Count	2 5.9%
6/12 Count	7 20.6%
6/9 Count	10 29.4%
6/6 Count	8 23.5%
6/5 Count	3 8.8%
Column total Count	34

TABLE A.150
Disrtibution of final visual acuity levels in the decompression subgroup.

Appendix C4 - Discriminant function analysis print out

This Discriminant Analysis requires 2360 (2.3K) BYTES of workspace.

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by SEVERE Severe ophthalmopathy

224 (unweighted) cases were processed.
107 of these were excluded from the analysis.
14 had missing or out-of-range group codes.
76 had at least one missing discriminating variable.
17 had both.
117 (unweighted) cases will be used in the analysis.

Number of Cases by Group

	Number of Cases		
SEVERE	Unweighted	Weighted	Label
1	77	77.0	Mild ophthalmopathy
2	40	40.0	Severe ophthalmopath
Total	117	117.0	

Group Means

SEVERE	AGE	CORR	EXOR	RAIX
1	4.31169	1.20779	20.36364	1.42857
2	4.32500	1.30000	22.90000	1.47500
Total	4.31624	1.23932	21.23077	1.44444

SEVERE	THYR	DIPEX	DU
1	1.48052	2.15584	49.72727
2	1.87500	2.67500	41.27500
Total	1.61538	2.33333	46.83761

Group Standard Deviations

SEVERE	AGE	CORR	EXOR	RAIX
1	1.41663	.56980	2.71404	.49812
2	1.40306	.51640	3.79473	.50574
Total	1.40596	.55164	3.33576	.49904

SEVERE	THYR	DIPEX	DU
1	.68076	1.40549	79.62753
2	.79057	1.32795	68.62570
Total	.74099	1.39581	75.85330

Pooled Within-Groups Covariance Matrix with 115 degrees of freedom

	AGE	CORR	EXOR	RAIX
AGE	1.993865			
CORR	-.7713156E-02	.3050028		
EXOR	.1701976	.9027668E-01	9.751462	
RAIX	.1872981	.2134224E-01	-.1747826	.2507143
THYR	.2790655	.7058159E-02	.2264822	.1088509
DIPEX	.5259543	-.4863919E-01	-.2057708	-.3450311E-01
DU	32.44722	-1.686403	53.40640	11.64152

	THYR	DIPEX	DU
THYR	.5182242		
DIPEX	.7485884E-01	1.903521	
DU	13.28231	-.3839328	5787.402

Pooled Within-Groups Correlation Matrix

	AGE	CORR	EXOR	RAIX	THYR	DIPEX	DU
AGE	1.00000						
CORR	-.00989	1.00000					
EXOR	.03860	.05235	1.00000				
RAIX	.26491	.07682	-.11178	1.00000			
THYR	.27454	.01775	.10075	.30198	1.00000		
DIPEX	.26997	-.06383	-.04776	-.04994	.07537	1.00000	
DU	.30202	-.04490	.22481	.30562	.24253	-.00366	1.00000

Correlations which cannot be computed are printed as '.'

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 115 degrees of freedom

Variable	Wilks' Lambda	F	Significance
AGE	.99998	.2340E-02	.9615
CORR	.99366	.7338	.3934
EXOR	.86880	17.37	.0001
RAIX	.99804	.2263	.6352
THYR	.93568	7.905	.0058
DIPEX	.96861	3.727	.0560
DU	.99718	.3350	.5698

Covariance Matrix for Group 1, Mild ophthalmopathy

	AGE	CORR	EXOR	RAIX
AGE	2.006835			
CORR	-.6561859E-01	.3246753		
EXOR	.2272727	.1602871	7.366029	
RAIX	.2067669	.2819549E-01	-.1973684	.2481203
THYR	.4798360	.3041695E-01	.2834928	.1071429
DIPEX	.5823650	-.4596719E-01	-.1363636	-.1503759E-01
DU	46.33612	-5.297847	32.16627	12.48684

	THYR	DIPEX	DU
THYR	.4634313		
DIPEX	.9518113E-01	1.975393	
DU	16.72468	11.05622	6340.543

Covariance Matrix for Group 2, Severe ophthalmopath

	AGE	CORR	EXOR	RAIX
AGE	1.968590			
CORR	.1051282	.2666667		
EXOR	.5897436E-01	-.4615385E-01	14.40000	
RAIX	.1493590	.7692308E-02	-.1307692	.2557692
THYR	-.1121795	-.3846154E-01	.1153846	.1121795
DIPEX	.4160256	-.5384615E-01	-.3410256	-.7243590E-01
DU	5.369872	4.761538	94.79744	9.994231

	THYR	DIPEX	DU
THYR	.6250000		
DIPEX	.3525641E-01	1.763462	
DU	6.573718	-22.67756	4709.487

Total Covariance Matrix with 116 degrees of freedom

	AGE	CORR	EXOR	RAIX
AGE	1.976717			
CORR	-.7368111E-02	.3043030		
EXOR	.1763926	.1425729	11.12732	
RAIX	.1858238	.2203065E-01	-.1465517	.2490421
THYR	.2778515	.1525199E-01	.4515915	.1120690
DIPEX	.5229885	-.3735632E-01	.9482759E-01	-.2873563E-01
DU	32.13800	-2.047009	48.08090	11.45211

	THYR	DIPEX	DU
THYR	.5490716		
DIPEX	.1206897	1.948276	
DU	12.41114	-1.376437	5753.723

- - - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - - -

On groups defined by SEVERE Severe ophthalmopathy

Analysis number 1

Stepwise variable selection

Selection rule: Minimize Wilks' Lambda
Maximum number of steps..... 14
Minimum Tolerance Level..... .00100
Minimum F to enter..... 1.0000
Maximum F to remove..... 1.0000

Canonical Discriminant Functions

Maximum number of functions..... 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probability for each group is .50000

---------- Variables not in the analysis after step 0 ----------

Variable	Tolerance	Minimum Tolerance	F to enter	Wilks' Lambda
AGE	1.0000000	1.0000000	.23396E-02	.99998
CORR	1.0000000	1.0000000	.73383	.99366
EXOR	1.0000000	1.0000000	17.367	.86880
RAIX	1.0000000	1.0000000	.22634	.99804
THYR	1.0000000	1.0000000	7.9049	.93568
DIPEX	1.0000000	1.0000000	3.7274	.96861
DU	1.0000000	1.0000000	.32496	.99718

At step 1, EXOR was included in the analysis.

		Degrees of Freedom		Signif.	Between Group
Wilks' Lambda	.86880	1	1	115.0	
Equivalent F	17.3667		1	115.0	.0001

---------- Variables in the analysis after step 1 ----------

Variable	Tolerance	F to remove	Wilks' Lambda
EXOR	1.0000000	17.367	

---------- Variables not in the analysis after step 1 ----------

Variable	Tolerance	Minimum Tolerance	F to enter	Wilks' Lambda
AGE	.9985102	.9985102	.10913E-01	.86872
CORR	.9972598	.9972598	.35207	.86612
RAIX	.9875047	.9875047	.77323	.86295
THYR	.9898497	.9898497	4.9771	.83245
DIPEX	.9977189	.9977189	3.9151	.83995
DU	.9494602	.9494602	2.0598	.85338

F statistics and significances between pairs of groups after step 1
Each F statistic has 1 and 115.0 degrees of freedom.

Group	Group 1 Mild oph thalmopathy
2 Severe o phthalmopath	17.367 .0001

At step 2, THYR was included in the analysis.

		Degrees of Freedom		Signif.	Between Group
Wilks' Lambda	.83245	2	1	115.0	
Equivalent F	11.4722		2	114.0	.0000

---------- Variables in the analysis after step 2 ----------

Variable	Tolerance	F to remove	Wilks' Lambda
EXOR	.9898497	14.137	.93568
THYR	.9898497	4.9771	.86880

---------- Variables not in the analysis after step 2 ----------

Variable	Tolerance	Minimum Tolerance	F to enter	Wilks' Lambda
AGE	.9245090	.9164904	.51973	.82964
CORR	.9971025	.9872927	.30359	.83022
RAIX	.8883755	.8883755	.31413E-01	.83222
DIPEX	.9912237	.9834056	3.0928	.81028
DU	.9006151	.9006151	3.7731	.80556

F statistics and significances between pairs of groups after step 2
Each F statistic has 2 and 114.0 degrees of freedom.

Group		Group 1 Mild oph thalmopathy
2	Severe o phthalmopath	11.472 .0000

At step 3, DU was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.80556	3	115.0		
Equivalent F	9.09189	3	113.0	.0000	

---------- Variables in the analysis after step 3 ----------

Variable	Tolerance	F to remove	Wilks' Lambda
EXOR	.9471900	16.499	.92317
THYR	.9389267	6.7083	.85338
DU	.9006151	3.7731	.83245

---------- Variables not in the analysis after step 3 ----------

Variable	Tolerance	Minimum Tolerance	F to enter	Wilks' Lambda
AGE	.8641152	.8417621	.51699E-01	.80518
CORR	.9931795	.8970713	.17734	.80428
RAIX	.8126426	.8126426	.58098	.80140
DIPEX	.9910958	.9004989	2.8928	.78527

F statistics and significances between pairs of groups after step 3
Each F statistic has 3 and 113.0 degrees of freedom.

Group		Group 1 Mild oph thalmopathy
2	Severe o phthalmopath	9.0919 .0000

At step 4, DIPEX was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.78527	4	1	115.0	
Equivalent F	7.65633		4	112.0	.0000

---------- Variables in the analysis after step 4 ----------

Variable	Tolerance	F to remove	Wilks' Lambda
EXOR	.9446051	16.700	.90237
THYR	.9327432	5.7008	.82524
DIPEX	.9910958	2.8928	.80556
DU	.9004989	3.5661	.81028

---------- Variables not in the analysis after step 4 ----------

Variable	Tolerance	Minimum Tolerance	F to enter	Wilks' Lambda
AGE	.7996982	.7996982	.49955	.78176
CORR	.9891681	.8968603	.27168	.78336
RAIX	.8065752	.8065752	.80462	.77962

F statistics and significances between pairs of groups after step 4
Each F statistic has 4 and 112.0 degrees of freedom.

	Group	1
		Mild oph thalmopathy
Group 2	Severe o phthalmopath	7.6563 .0000

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars In	Wilks' Lambda	Sig.	Label
1	EXOR		1	.86880	.0001	Exophthalmos R.
2	THYR		2	.83245	.0000	Thyroid status at onset
3	DU		3	.80556	.0000	Duration of thyroid dysfunction
4	DIPEX		4	.78527	.0000	Diplopia on examination

Classification Function Coefficients
(Fisher's Linear Discriminant Functions)

SEVERE =	1 Mild oph thalmopathy	2 Severe o phthalmopath
EXOR	2.153705	2.433647
THYR	2.144206	2.890815
DIPEX	1.277797	1.550274
DU	-.1611842E-01	-.2185762E-01
(constant)	-25.18565	-32.89095

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	DF	Sig
					0	.7853	27.315	4	.0000
1*	.2734	100.00	100.00	.4634					

* marks the 1 canonical discriminant functions remaining in the analysis.

Standardized Canonical Discriminant Function Coefficients

	FUNC 1
EXOR	.79984
THYR	.49176
DIPEX	.34396
DU	-.39948

Structure Matrix:

Pooled-within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	FUNC 1
EXOR	.74315
THYR	.50138
DIPEX	.34429
AGE	.13809
DU	-.10166
RAIX	-.08017
CORR	.04658

Unstandardized Canonical Discriminant Function Coefficients

	FUNC 1
EXOR	.2561361
THYR	.6831180
DIPEX	.2493058
DU	-.5251142E-02
(constant)	-6.877228

Canonical Discriminant Functions evaluated at Group Means (Group Centroids)

Group	FUNC 1
1	-.37366
2	.71929

Test of equality of group covariance matrices using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group	Label	Rank	Log Determinant
1	Mild ophthalmopathy	4	10.508918
2	Severe ophthalmopath	4	10.995859
	Pooled Within-Groups Covariance Matrix	4	10.803390

Box's M	Approximate F	Degrees of freedom		Significance
14.974	1.4227	10,	29763.2	.1629

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			1		1	.9099	.5826	2	.4172	-.1331
2			1		1	.5893	.5018	2	.4982	.1662
5			1		1	.9202	.6697	2	.3303	-.4739
6			2		2	.5382	.7807	1	.2193	1.3348
7			1		1	.7863	.7096	2	.2904	-.6447
8			1		1	.1094	.9127	2	.0873	-1.9745
11			Ungrpd		2	.7585	.5649	1	.4351	.4119
12			Ungrpd		1	.8013	.5798	2	.4202	-.1219
13			1		1	.2006	.8804	2	.1196	-1.6535
16			2		2	.8726	.6841	1	.3159	.8796
18			Ungrpd		2	.6165	.7585	1	.2415	1.2201
19			2		2	.5126	.7880	1	.2120	1.3742
23			Ungrpd		2	.8314	.6963	1	.3037	.9322
25			2		2	.3068	.8474	1	.1526	1.7413
26			1		1	.6090	.7606	2	.2394	-.8851
28			Ungrpd		1	.6851	.5385	2	.4615	.0318
29			2		2	.9892	.6416	1	.3584	.7058
30			2		2	.4213	.8140	1	.1860	1.5235
32			2	**	1	.5955	.5042	2	.4958	.1573
33			Ungrpd		1	.4598	.8030	2	.1970	-1.1129
34			2		2	.7840	.7103	1	.2897	.9934

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
35			1	**	2	.9589	.6578	1	.3422	.7709
36			1		1	.2197	.8742	2	.1258	-1.6010
37			1	**	2	.8240	.5876	1	.4124	.4969
38			Ungrpd		2	.8823	.6812	1	.3188	.8674
39			1	**	2	.9340	.6655	1	.3345	.8021
40			Ungrpd		1	.6501	.7490	2	.2510	-.8273
41			2		2	.7597	.5654	1	.4346	.4134
44			1		1	.6079	.5091	2	.4909	.1394
46			1		1	.8381	.6944	2	.3056	-.3789
47			2	**	1	.6608	.5294	2	.4706	.0652
49			2	**	1	.6979	.7353	2	.2647	-.7619
51			2		2	.0209	.9578	1	.0422	3.0289
52			1		1	.6751	.5347	2	.4653	.0455
53			Ungrpd		2	.7745	.5706	1	.4294	.4329
54			1		1	.7396	.7232	2	.2768	-.7061
56			1		1	.2808	.8552	2	.1448	-1.4522
57			1		1	.7770	.5714	2	.4286	-.0904
59			Ungrpd		2	.7656	.7157	1	.2843	1.0175
60			2		2	.1057	.9143	1	.0857	2.5586
61			1		1	.8352	.6952	2	.3048	-.3817
62			1		1	.9527	.6594	2	.3406	-.1715

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
63			1		1	.9070	.6157	2	.3847	-.2568
64			2	**	1	.9077	.6735	2	.3265	-.4896
66			1		1	.2252	.8724	2	.1276	-1.5864
68			2		2	.3811	.8256	1	.1744	1.5952
69			1		1	.8009	.5797	2	.4203	-.1014
70			1		1	.3462	.8357	2	.1643	-1.3157
71			1		1	.1707	.8904	2	.1096	-1.7435
75			1		1	.2177	.8748	2	.1252	-1.6062
76			2	**	1	.8860	.6800	2	.3200	-.5170
77			1		1	.2197	.8742	2	.1258	-1.6010
79			2	**	1	.8393	.6940	2	.3060	-.5764
81			1		1	.9952	.6465	2	.3535	-.3797
83			1		1	.0674	.9306	2	.0694	-2.2025
84			1		1	.1793	.8874	2	.1126	-1.7165
85			2	**	1	.6686	.7437	2	.2563	-.8017
86			2		2	.2164	.8753	1	.1247	1.9555
87			2		2	.9545	.6306	1	.3694	.6622
88			2	**	1	.8971	.6767	2	.3233	-.5030
89			1	**	2	.1785	.8877	1	.1123	2.0646
90			1	**	2	.4292	.8117	1	.1883	1.5098
91			1		1	.8235	.5875	2	.4125	-.1506

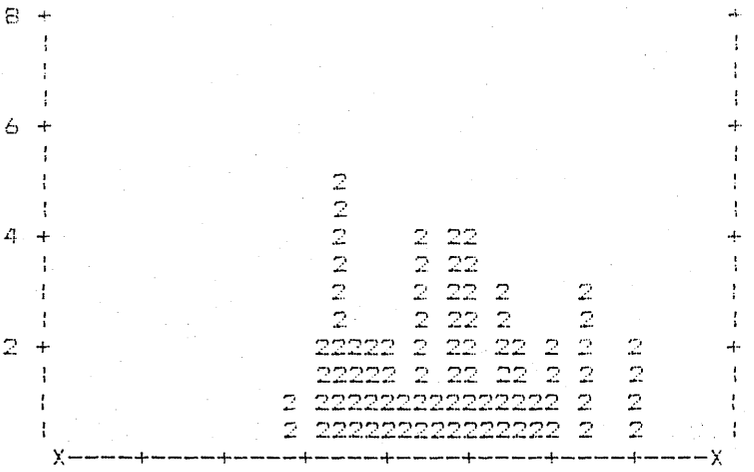
Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
92			1		1	.6425	.7511	2	.2489	-.8378
94			2		2	.7637	.5668	1	.4332	.4187
95			2	**	1	.9745	.6370	2	.3630	-.3417
97			1		1	.7294	.5546	2	.4454	-.0278
100			1	**	2	.8349	.6953	1	.3047	.9277
103			1		1	.9969	.6460	2	.3540	-.3776
104			1		1	.6664	.7443	2	.2557	-.8048
106			1		1	.8397	.6939	2	.3061	-.5760
109			1		1	.9755	.6373	2	.3627	-.3429
113			1		1	.6372	.7526	2	.2474	-.8453
114			1		1	.8053	.5812	2	.4188	-.1272
115			1		1	.8053	.5812	2	.4188	-.1272
116			1		1	.8513	.5969	2	.4031	-.1862
117			2	**	1	.8352	.6952	2	.3048	-.5817
118			1		1	.7847	.5741	2	.4259	-.1004
119			1		1	.4617	.8025	2	.1975	-1.1097
120			2		2	.7307	.5550	1	.4450	.3751
122			2		2	.7071	.7326	1	.2674	1.0950
126			2		2	.8266	.6978	1	.3022	.9383
127			2		2	.7670	.7153	1	.2847	1.0156
128			1		1	.6738	.5342	2	.4658	.0473

ıse: ber	Mis Val	Sel	Actual Group		Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
129			1	**	2	.9633	.6565	1	.3435	.7653
130			1		1	.8434	.6928	2	.3072	-.5712
131			2		2	.9298	.6667	1	.3333	.8073
132			1		1	.9905	.6421	2	.3579	-.3618
133			1		1	.7151	.7303	2	.2697	-.7387
134			1		1	.4085	.8177	2	.1823	-1.2002
136			1		1	.5894	.5018	2	.4982	.1661
139			1		1	.2986	.8498	2	.1502	-1.4131
142			1	**	2	.7647	.5671	1	.4329	.4199
148			1		1	.9725	.6364	2	.3636	-.3392
149			2		2	.6565	.7471	1	.2529	1.1640
150			1		1	.3737	.8277	2	.1723	-1.2632
152			2		2	.9353	.6651	1	.3349	.8005
154			1		1	.6151	.7589	2	.2411	-.8765
155			1		1	.6152	.5120	2	.4880	.1289
157			2	**	1	.8494	.5962	2	.4038	-.1837
159			2	**	1	.7766	.5713	2	.4287	-.0899
160			1	**	2	.6839	.5380	1	.4620	.3121
161			1		1	.0740	.9276	2	.0724	-2.1605
162			1		1	.7932	.7076	2	.2924	-.6358
164			2		2	.6839	.5380	1	.4620	.3121

se ber	Mis Val	Sel	Actual Group		Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
165			1	**	2	.1137	.9110	1	.0890	2.3009
166			Ungrpd		2	.9039	.6746	1	.3254	.8401
167			1	**	2	.6426	.7511	1	.2489	1.1834
168			1	**	2	.9465	.6281	1	.3719	.6522
169			1		1	.8623	.6005	2	.3995	-.2002
171			2		2	.4669	.8010	1	.1990	1.4469
172			1		1	.4122	.8166	2	.1834	-1.1937
173			1		1	.6659	.5313	2	.4687	.0582
174			2	**	1	.4113	.8169	2	.1831	-1.1953
175			2	**	1	.8427	.5940	2	.4060	-.1752
176			1		1	.3441	.8363	2	.1637	-1.3198
177			2		2	.0945	.9187	1	.0813	2.3914
.79			Ungrpd		2	.6946	.5419	1	.4581	.3266
180			2	**	1	.8233	.6987	2	.3013	-.5969
.82			1		1	.9538	.6304	2	.3696	-.3158
.83			1	**	2	.9620	.6330	1	.3670	.6717
.88			1		1	.6313	.7543	2	.2457	-.8536
.89			1		1	.8184	.5857	2	.4143	-.1440
90.			1	**	2	.8163	.5850	1	.4150	.4870
.91			1		1	.4964	.7926	2	.2074	-1.0539
92			2		2	.0228	.9563	1	.0437	2.9958

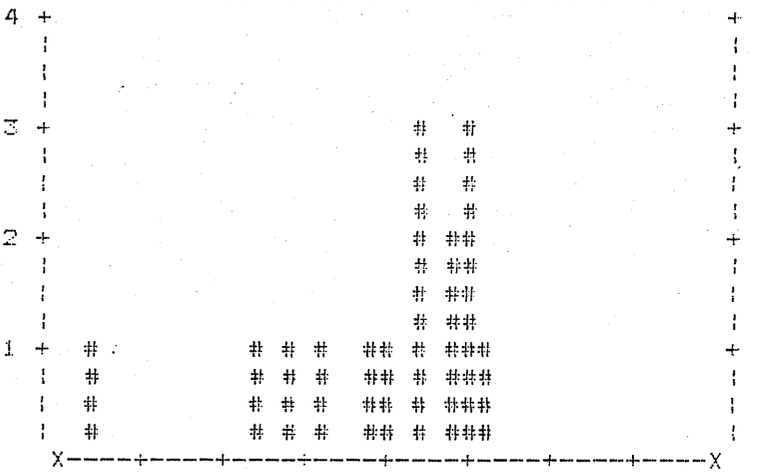
Histogram for Group 2 Severe ophthalmopath

Canonical Discriminant Function 1



Histogram for ungrouped cases

Canonical Discriminant Function 1

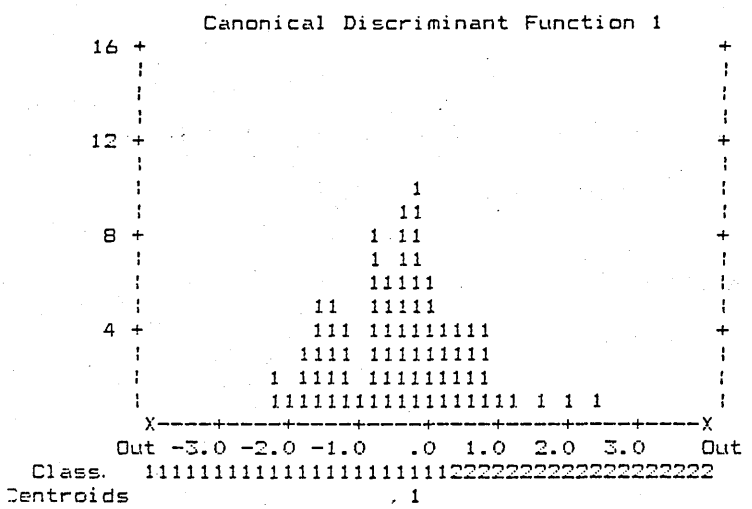


Case Number	Mis Val	Sel	Actual Group		Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
194			Ungrpd		2	.7479	.7208	1	.2792	1.0407
195			Ungrpd		1	.1999	.8806	2	.1194	-1.6554
197			Ungrpd		1	.0010	.9852	2	.0148	-3.6659
198			2		2	.0947	.9186	1	.0814	2.3905
199			1		1	.3135	.8454	2	.1546	-1.3816
200			1	**	2	.8312	.5901	1	.4099	.5061
201			1		1	.1694	.8908	2	.1092	-1.7476
206			1		1	.7610	.5658	2	.4342	-.0694
207			1		1	.9389	.6640	2	.3360	-.4504
208			1	**	2	.9838	.6399	1	.3601	.6990
212			1	**	2	.9986	.6446	1	.3554	.7175
214			2		2	.2079	.8780	1	.1220	1.9786

Symbols used in Plots

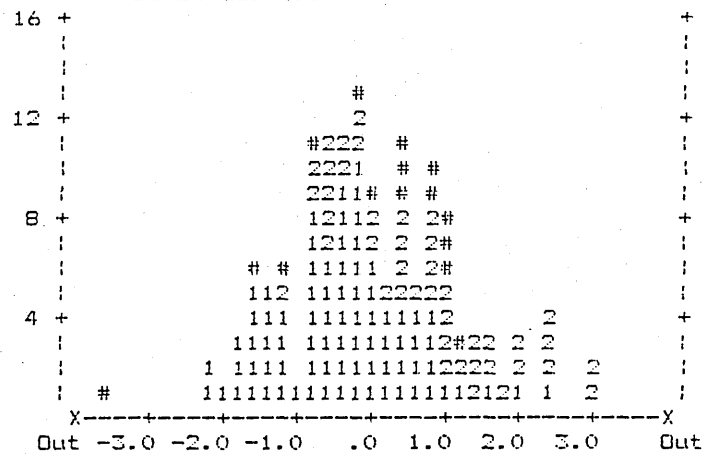
Symbol	Group	Label
1	1	Mild ophthalmopathy
2	2	Severe ophthalmopath
#		All Ungrouped Cases

Histogram for Group 1 Mild ophthalmopathy



All-groups stacked Histogram

Canonical Discriminant Function 1



Classification Results -

Actual Group	No. of Cases	Predicted Group Membership 1	2
Group 1 Mild ophthalmopathy	81	64 79.0%	17 21.0%
Group 2 Severe ophthalmopath	42	15 35.7%	27 64.3%
Ungrouped Cases	15	6 40.0%	9 60.0%

Percent of "grouped" cases correctly classified: 73.96%

Classification Processing Summary
224 Cases were processed.
0 Cases were excluded for missing or out-of-range group codes.
86 Cases had at least one missing discriminating variable.
138 Cases were used for printed output.

This procedure was completed at 0:41:19

SPSS/PC+

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by DCMPR Decompression R.

224 (unweighted) cases were processed.
137 of these were excluded from the analysis.
8 had missing or out-of-range group codes.
106 had at least one missing discriminating variable.
23 had both.
87 (unweighted) cases will be used in the analysis.

Number of Cases by Group

	Number of Cases		
DCMPR	Unweighted	Weighted	Label
1	62	62.0	No
2	25	25.0	Yes
Total	87	87.0	

Group Means

DCMPR	SEX	AGE	DU	VAR
1	1.79032	48.59677	37.27419	15.83871
2	1.80000	47.24000	60.12000	14.72000
Total	1.79310	48.20690	43.83908	15.51724

DCMPR	LODR	CHEMOR	CORR	DODR
1	1.35484	1.11290	1.22581	1.04839
2	1.60000	1.44000	1.28000	1.12000
Total	1.42529	1.20690	1.24138	1.06897

DCMPR	CHFLDR	IOPSTR	EXOR	SYMDIP
1	1.00000	16.77419	20.33871	1.62903
2	1.08000	20.08000	23.44000	1.68000
Total	1.02299	17.72414	21.22989	1.64368

DCMPR	DIPEX	EOMR	THYR	PTHDMY
1	2.14516	3.35484	1.53226	1.12903
2	2.08000	4.44000	1.64000	1.20000
Total	2.12644	3.66667	1.56322	1.14943

DCMPR	RAIX
1	1.40323
2	1.44000
Total	1.41379

Group Standard Deviations

DCMPR	SEX	AGE	DU	VAR
1	.41040	13.26212	63.65382	1.32063
2	.40825	13.99190	109.79501	1.81475
Total	.40743	13.40786	79.66337	1.55415

DCMPR	LODR	CHEMOR	CORR	DODR
1	.48237	.31906	.61189	.21633
2	.50000	.50662	.45826	.33166
Total	.49725	.40743	.56989	.25486

DCMPR	CHFLDR	IOPSTR	EXOR	SYMDIP
1	.00000	3.54558	2.94175	.85380
2	.27689	3.62767	3.64097	.85245
Total	.15074	3.85399	3.43951	.84876

DCMPR	DIPEX	EOMR	THYR	PTHDMY
1	1.46932	2.92584	.74035	.33797
2	1.07703	3.35510	.75719	.40825
Total	1.36232	3.07528	.74242	.35857

DCMPR	RAIX
1	.49455
2	.50662
Total	.49537

Pooled Within-Groups Covariance Matrix with 85 degrees of freedom

	SEX	AGE	DU	VAR
SEX	.1679317			
AGE	-1.176964	181.4998		
DU	1.872524	333.1545	6311.517	
VAR	-.6466793E-01	-5.651203	-3.875507	2.181495
LODR	-.2808349E-01	2.038482	4.013738	.2056926E-01
CHEMOR	-.3920304E-01	1.590383	.9854194	-.3283491E-01
CORR	.1571157E-01	-.6827628	-4.607985	-.9155218E-01
DODR	-.4436433E-01	.4881139	-2.743324	-.4324858E-01
CHFLDR	-.1882353E-01	.3237647	-1.073412	-.2870588E-01
IOPSTR	-.1004175	6.692645	31.07763	-.3493890
EXOR	-.1693738	-1.931438	21.86967	-.2180342
SYMDIP	-.4026565E-01	3.772304	.8972524	-.8176091E-01
DIPEX	-.5544592E-01	.7311651	-8.114209	-.1162808E-01
EOMR	-.1904364	5.861541	-51.08650	-.3926072
THYR	-.1036053E-01	2.029017	4.918019	.3297154E-01
PTHDMY	.7969639E-02	.4003036	10.15537	-.3893738E-01
RAIX	.2872865E-01	.7816546	6.656767	.3661480E-01

	LODR	CHEMOR	CORR	DODR
LODR	.2375712			
CHEMOR	.9313093E-01	.1455256		
CORR	-.2550285E-01	.3992410E-02	.3279848	
DODR	.1335863E-01	.2754459E-01	-.6087287E-02	.6464516E-01
CHFLDR	.9411765E-02	.1317647E-01	-.6588235E-02	.2070588E-01
IOPSTR	.2325617	-.7411006E-01	.1883871E-01	.1227932
EXOR	.1876281	.1975180	.4915370E-01	.5486907E-01
SYMDIP	.9366224E-01	.2490323E-01	-.1842884E-01	.1262239E-01
DIPEX	-.8698292E-01	-.3407211E-01	-.5402657E-01	.1558254E-01
EOMR	.2187476	.1373662	.3473245E-01	.8959393E-01
THYR	-.2717268E-01	.2755218E-02	.8045541E-03	-.2960911E-01
PTHDMY	-.9867173E-02	.1055028E-01	-.2428843E-02	-.1161290E-01
RAIX	-.5540797E-02	-.7795066E-02	.3233397E-02	-.1799620E-01

	CHFLDR	IOPSTR	EXOR	SYMDIP
CHFLDR	.2164706E-01			
IOPSTR	.5694118E-01	12.73740		
EXOR	.4847059E-01	2.233670	9.953495	
SYMDIP	.7529412E-02	.2993700	.2718027E-01	.7283264
DIPEX	.9882353E-02	-.1897381	.2437192E-01	.4232789
EOMR	.8376471E-01	1.483385	-.1093131	1.537427
THYR	-.1505882E-01	-.1744516	.3974421	.1101404
PTHDMY	-.4705882E-02	-.1834535	.1540038	-.5085389E-02
RAIX	-.1035294E-01	.3253131E-01	-.1800911	-.1418596E-01

	DIPEX	EOMR	THYR	PTHDMY
DIPEX	1.876865			
EOMR	1.975605	9.321806		
THYR	.2109374	.2382391	.5552410	
PTHDMY	.1692600E-01	-.5927894E-01	.2990512E-01	.1290323
RAIX	-.1471651	-.9071727E-01	.7827704E-01	-.1677419E-01

	RAIX
RAIX	.2479924

Pooled Within-Groups Correlation Matrix

	SEX	AGE	DU	VAR	LODR	CHEMOR	CORR
SEX	1.00000						
AGE	-.21319	1.00000					
DU	.05752	.31127	1.00000				
VAR	-.10684	-.28400	-.03303	1.00000			
LODR	-.14060	.31044	.10365	.02857	1.00000		
CHEMOR	-.25077	.30945	.03252	-.05828	.50087	1.00000	
CORR	.06695	-.08849	-.10128	-.10823	-.09136	.01827	1.00000
DODR	-.42579	.14250	-.13581	-.11517	.10779	.28399	-.04181
CHFLDR	-.31220	.16334	-.09183	-.13210	.13124	.23476	-.07819
IOPSTR	-.06866	.13919	.10961	-.06628	.13369	-.05443	.00922
EXOR	-.13101	-.04544	.08725	-.04679	.12201	.16412	.02720
SYMDIP	-.11513	.32810	.01323	-.06486	.22517	.07649	-.03771
DIPEX	-.09876	.03962	-.07455	-.00575	-.13026	-.06519	-.06886
EOMR	-.15221	.14250	-.21061	-.08706	.14699	.11794	.01986
THYR	-.03393	.20212	.08308	.02996	-.07482	.00969	.00189
PTHDMY	.05414	.08272	.35586	-.07339	-.05636	.07699	-.01181
RAIX	.14078	.11651	.16826	.04978	-.02283	-.04103	.01134

	DODR	CHFLDR	IOPSTR	EXOR	SYMDIP	DIPEX	EOMR
DODR	1.00000						
CHFLDR	.55351	1.00000					
IOPSTR	.13532	.10844	1.00000				
EXOR	.06840	.10442	.19838	1.00000			
SYMDIP	.05817	.05997	.09829	.01009	1.00000		
DIPEX	.04474	.04903	-.03881	.00564	.36203	1.00000	
EOMR	.11541	.18647	.13613	-.01135	.59004	.47232	1.00000
THYR	-.15628	-.13736	-.06560	.16906	.17320	.20663	.10472
PTHDMY	-.12715	-.08904	-.14310	.13589	-.01659	.03439	-.05405
RAIX	-.14213	-.14130	.01830	-.11463	-.03338	-.21571	-.05967

	THYR	PTHDMY	RAIX
THYR	1.00000		
PTHDMY	.11173	1.00000	
RAIX	.21095	-.09377	1.00000

Correlations which cannot be computed are printed as '.'

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 85 degrees of freedom

Variable	Wilks' Lambda	F	Significance
SEX	.99988	.9936E-02	.9208
AGE	.99788	.1807	.6718
DU	.98296	1.473	.2282
VAR	.89266	10.22	.0020
LODR	.94964	4.507	.0367
CHEMOR	.86647	13.10	.0005
CORR	.99813	.1595	.6906
DODR	.98364	1.413	.2378
CHFLDR	.94165	5.267	.0242
IOPSTR	.84758	15.29	.0002

Variable	Wilks' Lambda	F	Significance
EXOR	.83158	17.22	.0001
SYMDIP	.99925	.6354E-01	.8016
DIPEX	.99953	.4030E-01	.8414
EOMR	.97421	2.251	.1373
THYR	.99564	.3725	.5433
PTHDMY	.99189	.6954	.4067
RAIX	.99886	.9715E-01	.7560

Covariance Matrix for Group 1, No

	SEX	AGE	DU	VAR
SEX	.1684294			
AGE	-1.348228	175.8839		
DU	1.976467	323.4566	4051.809	
VAR	-.8355368E-01	-2.885775	-3.102591	1.744051
LODR	-.6345849E-02	1.670016	2.458488	.7456372E-01
CHEMOR	-.2511898E-01	.7511898	-1.506875	.8408250E-01
CORR	.1533580E-01	-1.153358	-3.964569	.5341089E-01
DODR	-.3886832E-01	.1837652	-1.390534	.4071920E-01
CHFLDR	.0000000	.0000000	.0000000	.0000000
IOPSTR	-.3172924E-01	1.300899	15.39080	-.3976732
EXOR	.5579059E-01	-4.844791	39.16790	-.2723427
SYMDIP	-.6266526E-01	3.421735	8.709942	.2115283E-01
DIPEX	-.1002115	.3545743	1.664463	-.4177684E-01
EOMR	-.2030672	3.014278	-10.44315	.8989952E-02
THYR	-.1771549E-01	2.709942	10.06478	-.9307245E-01
PTHDMY	.1110524E-01	.5288207E-01	7.046007	-.4442094E-01
RAIX	.2035960E-01	1.296404	8.199101	-.3225806E-01

	LODR	CHEMOR	CORR	DODR
LODR	.2326811			
CHEMOR	.7403490E-01	.1017980		
CORR	-.3225806E-01	-.9518773E-02	.3744051	
DODR	.1533580E-01	.1084082E-01	-.1110524E-01	.4680063E-01
CHFLDR	.0000000	.0000000	.0000000	.0000000
IOPSTR	.1470122	-.2035960	.2649392	.9307245E-01
EXOR	-.2379693E-01	.1578530	.8619778E-01	.4891592E-01
SYMDIP	.5182443E-01	-.6610259E-02	-.1322052E-01	.1824432E-01
DIPEX	-.1507139	-.4944474E-01	-.4970915E-01	.2564781E-01
EOMR	.1998942	.9042834E-01	-.1586462E-01	.6451613E-01
THYR	-.6081438E-01	.4494976E-02	.8989952E-02	-.9783184E-02
PTHDMY	-.3014278E-01	-.1480698E-01	-.1322052E-01	-.6345849E-02
RAIX	.2115283E-02	.2908514E-02	.5817028E-02	-.3437335E-02

	CHFLDR	IOPSTR	EXOR	SYMDIP
CHFLDR	.0000000			
IOPSTR	.0000000	12.57113		
EXOR	.0000000	1.471179	8.653887	
SYMDIP	.0000000	.3246959	.1295611E-01	.7289794
DIPEX	.0000000	-.1306187	.3270756	.3989952
EOMR	.0000000	1.638815	-.1385510	1.494447
THYR	.0000000	-.9095717E-01	.4397144	.1351137
PTHDMY	.0000000	-.2326811	.1359069	-.5288207E-03
RAIX	.0000000	.7615019E-01	-.2535695	.4494976E-02

	DIPEX	EOMR	THYR	PTHDMY
DIPEX	2.158911			
EOMR	2.013221	8.560550		
THYR	.2657324	.2998414	.5481227	
PTHDMY	.7932311E-01	.6821787E-01	.2855632E-01	.1142253
RAIX	-.2234268	-.9624537E-01	.2776309E-01	-.3701745E-02

RAIX .2445796

Covariance Matrix for Group 2, Yes

	SEX	AGE	DU	VAR
SEX	.1666667			
AGE	-.7416667	195.7733		
DU	1.608333	357.8033	12054.94	
VAR	-.1666667E-01	-12.68000	-5.840000	3.293333
LODR	-.8333333E-01	2.975000	7.966667	-.1166667
CHEMOR	-.7500000E-01	3.723333	7.320000	-.3300000
CORR	.1666667E-01	.5133333	-6.243333	-.4600000
DODR	-.5833333E-01	1.261667	-6.181667	-.2566667
CHFLDR	-.6666667E-01	1.146667	-3.801667	-.1016667
IOPSTR	-.2750000	20.39667	70.94833	-.2266667
EXOR	-.7416667	5.473333	-22.09667	-.8000000E-01
SYMDIP	.1666667E-01	4.663333	-18.96000	-.3433333
DIPEX	.5833333E-01	1.688333	-32.96833	.6500000E-01
EOMR	-.1583333	13.09833	-154.3883	-1.413333
THYR	.8333333E-02	.2983333	-8.163333	.3533333
PTHDMY	.0000000	1.283333	18.05833	-.2500000E-01
RAIX	.5000000E-01	-.5266667	2.736667	.2116667

	LODR	CHEMOR	CORR	DODR
LODR	.2500000			
CHEMOR	.1416667	.2566667		
CORR	-.8333333E-02	.3833333E-01	.2100000	
DODR	.8333333E-02	.7000000E-01	.6666667E-02	.1100000
CHFLDR	.3333333E-01	.4666667E-01	-.2333333E-01	.7333333E-01
IOPSTR	.4500000	.2550000	-.6066667	.1983333
EXOR	.7250000	.2983333	-.4500000E-01	.7000000E-01
SYMDIP	.2000000	.1050000	-.3166667E-01	-.1666667E-02
DIPEX	.7500000E-01	.5000000E-02	-.6500000E-01	-.1000000E-01
EOMR	.2666667	.2566667	.1633333	.1533333
THYR	.5833333E-01	-.1666667E-02	-.2000000E-01	-.8000000E-01
PTHDMY	.4166667E-01	.7500000E-01	.2500000E-01	-.2500000E-01
RAIX	-.2500000E-01	-.3500000E-01	-.3333333E-02	-.5500000E-01

	CHFLDR	IOPSTR	EXOR	SYMDIP
CHFLDR	.7666667E-01			
IOPSTR	.2016667	13.16000		
EXOR	.1716667	4.171667	13.25667	
SYMDIP	.2666667E-01	.2350000	.6333333E-01	.7266667
DIPEX	.3500000E-01	-.3400000	-.7450000	.4850000
EOMR	.2966667	1.088333	-.3500000E-01	1.646667
THYR	-.5333333E-01	-.3866667	.2900000	.4666667E-01
PTHDMY	-.1666667E-01	-.5833333E-01	.2000000	-.1666667E-01
RAIX	-.3666667E-01	-.7833333E-01	.6666667E-02	-.6166667E-01

	DIPEX	EOMR	THYR	PTHDMY
DIPEX	1.160000			
EOMR	1.880000	11.25667		
THYR	.7166667E-01	.8166667E-01	.5733333	
PTHDMY	-.1416667	-.3833333	.3333333E-01	.1666667
RAIX	.4666667E-01	-.7666667E-01	.2066667	-.5000000E-01

	RAIX
RAIX	.2566667

Total Covariance Matrix with 86 degrees of freedom

	SEX	AGE	DU	VAR
SEX	.1659984			
AGE	-1.165998	179.7706		
DU	1.896552	322.8593	6346.253	
VAR	-.6615878E-01	-5.271051	-9.125100	2.415397
LODR	-.2726544E-01	1.945870	5.127372	-.3648757E-01
CHEMOR	-.3809142E-01	1.479952	2.522053	-.1082598
CORR	.1563753E-01	-.6900561	-4.297915	-.1030473
DODR	-.4370489E-01	.4623095	-2.372494	-.5934242E-01
CHFLDR	-.1844427E-01	.2975140	-.6823042	-.4691259E-01
IOPSTR	-.9262229E-01	5.685646	46.36207	-1.111468
EXOR	-.1611868	-2.780674	36.29324	-.9342422
SYMDIP	-.3969527E-01	3.714114	1.128041	-.9262229E-01
DIPEX	-.5493184E-01	.7409783	-8.328254	.3608661E-02
EOMR	-.1860465	5.488372	-45.35659	-.6395349
THYR	-.1002406E-01	1.975140	5.370756	.7618284E-02
PTHDMY	.8019246E-02	.3757017	10.37316	-.5493184E-01
RAIX	.2846832E-01	.7622294	6.753408	.2766640E-01

	LODR	CHEMOR	CORR	DODR
LODR	.2472601			
CHEMOR	.1086608	.1659984		
CORR	-.2245389E-01	.7618284E-02	.3247795	
DODR	.1684042E-01	.3207698E-01	-.5212510E-02	.6495589E-01
CHFLDR	.1336541E-01	.1844427E-01	-.5613472E-02	.2165196E-01
IOPSTR	.3977546	.1507618	.5573376E-01	.1704090
EXOR	.3429564	.4053729	.8340016E-01	.1002406
SYMDIP	.9516172E-01	.2806736E-01	-.1764234E-01	.1323176E-01
DIPEX	-.8928094E-01	-.3809142E-01	-.5412991E-01	.1443464E-01
EOMR	.2713178	.2093023	.4651163E-01	.1046512
THYR	-.2138466E-01	.1002406E-01	.2004812E-02	-.2766640E-01
PTHDMY	-.6148089E-02	.1523657E-01	-.1603849E-02	-.1042502E-01
RAIX	-.3608661E-02	-.5212510E-02	.3608661E-02	-.1724138E-01

	CHFLDR	IOPSTR	EXOR	SYMDIP
CHFLDR	.2272120E-01			
IOPSTR	.1110666	14.85325		
EXOR	.9930500E-01	4.331596	11.83026	
SYMDIP	.8286554E-02	.3307939	.5960973E-01	.7203956
DIPEX	.8687517E-02	-.2321572	-.1777600E-01	.4176691
EOMR	.1007752	2.209302	.5891473	1.531008
THYR	-.1309810E-01	-.9863673E-01	.4620422	.1099973
PTHDMY	-.3475007E-02	-.1327185	.1978081	-.4276931E-02
RAIX	-.9623095E-02	.5733761E-01	-.1543705	-.1363272E-01

	DIPEX	EOMR	THYR	PTHDMY
DIPEX	1.855921			
EOMR	1.937984	9.457364		
THYR	.2070302	.2596899	.5511895	
PTHDMY	.1577118E-01	-.4263566E-01	.3114141E-01	.1285752
RAIX	-.1459503	-.8139535E-01	.7818765E-01	-.1603849E-01

	RAIX
RAIX	.2453889

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by DCMPR Decompression R.

Analysis number 1
Direct method: All variables passing the tolerance test are entered.
  Minimum Tolerance Level..... .00100

Canonical Discriminant Functions

  Maximum number of functions..... 1
  Minimum cumulative percent of variance... 100.00
  Maximum significance of Wilks' Lambda.... 1.0000

Prior probability for each group is .50000

Classification Function Coefficients
(Fisher's Linear Discriminant Functions)

DCMPR =	1	2
	No	Yes
SEX	34.43653	34.77969
AGE	.7937260	.7167169
DU	-.5984335E-01	-.5559207E-01
VAR	12.29787	11.71575
LODR	-.6195367	-.3577006
CHEMOR	-.4491282	2.165167
CORR	7.962984	7.834769
DODR	22.53453	21.82576
CHFLDR	57.73931	60.55668
IOPSTR	1.033142	1.290190
EXOR	2.439693	2.586338
SYMDIP	.3186888	.2813034
DIPEX	2.427745	2.449663
EOMR	-.4935659	-.4263808
THYR	-1.046309	-.6673128
PTHDMY	16.05798	16.35073
RAIX	7.202805	7.690171
(constant)	-240.8023	-244.5936

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	DF	Sig
					: 0	.5841	41.130	17	.0009
1*	.7120	100.00	100.00	.6449	:				

* marks the 1 canonical discriminant functions remaining in the analysis.

Standardized Canonical Discriminant Function Coefficients

	FUNC 1
SEX	.07630
AGE	-.56292
DU	.18325
VAR	-.46650
LODR	.06925
CHEMOR	.54111
CORR	-.03984
DODR	-.09778
CHFLDR	.22491
IOPSTR	.49776
EXOR	.25103
SYMDIP	-.01731
DIPEX	.01629
EOMR	.11130
THYR	.15323
PTHDMY	.05706
RAIX	.13169

Structure Matrix:

Pooled-within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	FUNC 1
EXOR	.53336
IOPSTR	.50258
CHEMOR	.46523
VAR	-.41097
CHFLDR	.29502
LODR	.27291
EOMR	.19285
DU	.15603
DODR	.15282
PTHDMY	.10720
THYR	.07845
AGE	-.05464
CORR	.05134
RAIX	.04007
SYMDIP	.03240
DIPEX	-.02581
SEX	.01281

Unstandardized Canonical Discriminant Function Coefficients

	FUNC 1
SEX	.1861930
AGE	-.4178372E-01
DU	.2306667E-02
VAR	-.3158448
LODR	.1420675
CHEMOR	1.418469
CORR	-.6956673E-01
DODR	-.3845612
CHFLDR	1.528657
IOPSTR	.1394698
EXOR	.7956707E-01
SYMDIP	-.2028461E-01
DIPEX	.1189265E-01
EOMR	.3645342E-01
THYR	.2056365
PTHDMY	.1588396
RAIX	.2644355
(constant)	-1.665150

Canonical Discriminant Functions evaluated at Group Means (Group Centroids)

Group	FUNC 1
1	-.52961
2	1.31343

Test of equality of group covariance matrices using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group	Label	Rank	Log Determinant
1	No	16	(singular)
2	Yes	17	-1.105362
	Pooled Within-Groups Covariance Matrix	17	1.686247

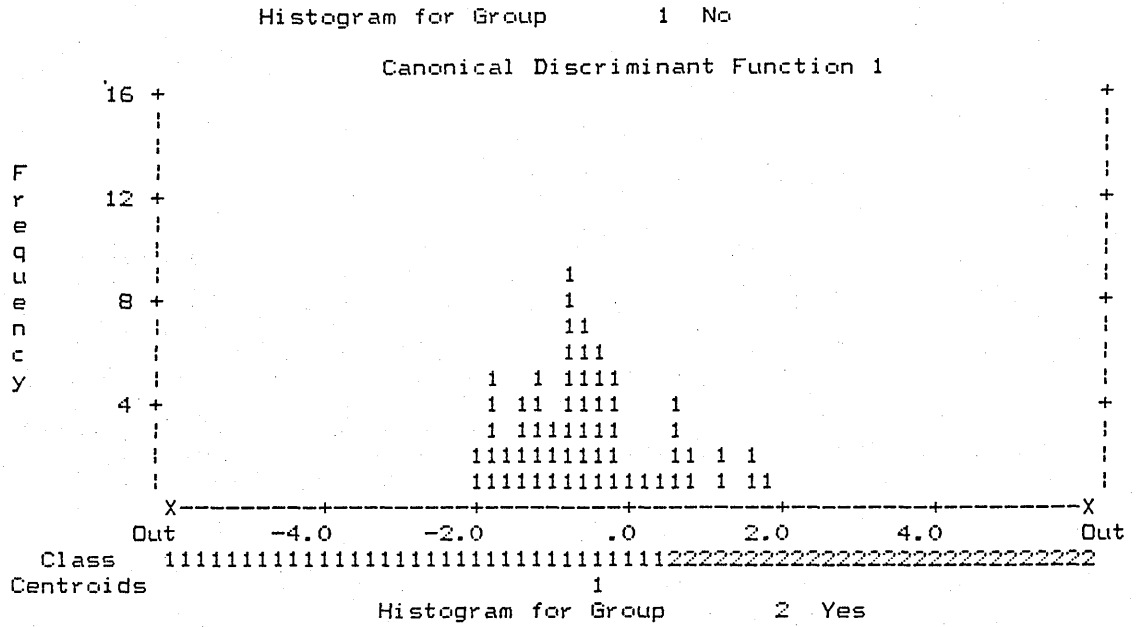
NOTE 10473
NOT ENOUGH NON-SINGULAR GROUP COVARIANCE MATRICES FOR DSC--At least two are required for a test to be performed.

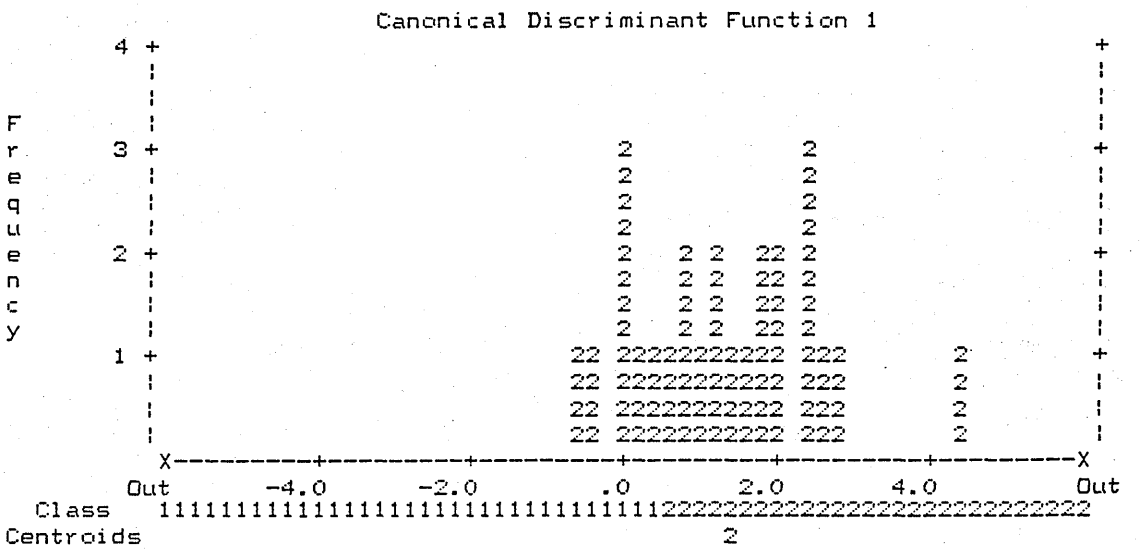
Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
11			Ungrpd		1	.0502	.9951	2	.0049	-2.4877
18			Ungrpd		1	.7596	.9057	2	.0943	-.8357
19			Ungrpd		2	.4476	.9568	1	.0432	2.0728
30			2		2	.7812	.7661	1	.2339	1.0357
32			2		2	.5080	.6173	1	.3827	.6514
33			Ungrpd		2	.4915	.6060	1	.3940	.6254
34			2	**	1	.6535	.7050	2	.2950	-.0807
36			1		1	.7268	.9123	2	.0877	-.8790
38			Ungrpd		1	.5941	.9359	2	.0641	-1.0626
39			1		1	.8587	.7974	2	.2026	-.3516
40			Ungrpd		1	.7953	.8981	2	.1019	-.7890
41			2	**	1	.9793	.8515	2	.1485	-.5556
44			1		1	.6722	.7147	2	.2853	-.1064
46			1		1	.4530	.5782	2	.4218	.2209
47			1		1	.4297	.9591	2	.0409	-1.3193
49			Ungrpd		1	.4267	.5581	2	.4419	.2652
51			1	**	2	.7990	.8973	1	.1027	1.5681
52			1		1	.5702	.9396	2	.0604	-1.0974
57			1		1	.4962	.9504	2	.0496	-1.2101
60			2		2	.1558	.9868	1	.0132	2.7329
61			1		1	.3610	.9671	2	.0329	-1.4430
62			1		1	.7642	.9048	2	.0952	-.8296
63			1	**	2	.4433	.5709	1	.4291	.5469
64			1		1	.6449	.9274	2	.0726	-.9905
66			1		1	.9555	.8583	2	.1417	-.5855
68			1		1	.7444	.9088	2	.0912	-.8557
69			1		1	.7071	.7322	2	.2678	-.1538
70			1		1	.8384	.8884	2	.1116	-.7336
71			1		1	.2026	.9828	2	.0172	-1.8038
75			1		1	.9859	.8410	2	.1590	-.5119
76			2	**	1	.6361	.6956	2	.3044	-.0565
77			1		1	.2186	.9814	2	.0186	-1.7598
79			2	**	1	.5690	.6567	2	.3433	.0399
81			1	**	2	.9399	.8263	1	.1737	1.2381
84			1		1	.5037	.9493	2	.0507	-1.1983
85			2		2	.8533	.8848	1	.1152	1.4983
86			2		2	.0028	.9993	1	.0007	4.3034
87			2		2	.9290	.8226	1	.1774	1.2243
88			1		1	.8483	.8861	2	.1139	-.7210
89			1	**	2	.4317	.5620	1	.4380	.5272
90			1	**	2	.9153	.8179	1	.1821	1.2071
91			1		1	.8260	.7847	2	.2153	-.3098
94			2		2	.3581	.5012	1	.4988	.3945
97			1		1	.7167	.7368	2	.2632	-.1667
100			1		1	.9522	.8592	2	.1408	-.5895
103			1		1	.4128	.9611	2	.0389	-1.3485
106			1		1	.8302	.7864	2	.2136	-.3151
113			2		2	.7170	.9142	1	.0858	1.6758
115			1		1	.8306	.8902	2	.1098	-.7435
117			2		2	.5796	.9382	1	.0618	1.8674
119			1		1	.6845	.9204	2	.0796	-.9359
122			2		2	.9643	.8342	1	.1658	1.2687
127			2		2	.2522	.9783	1	.0217	2.4585
128			1		1	.5402	.9441	2	.0559	-1.1421
129			1		1	.7707	.7615	2	.2385	-.2381
130			1		1	.9496	.8600	2	.1400	-.5928
131			2	**	1	.5022	.6134	2	.3866	.1414
132			1	**	2	.6157	.6843	1	.3157	.8115
133			1	**	2	.5769	.6615	1	.3385	.7555
134			1		1	.8815	.8059	2	.1941	-.3805
136			1		1	.9685	.8546	2	.1454	-.5691
139			1		1	.8020	.8967	2	.1033	-.7804
149			2		2	.6625	.9243	1	.0757	1.7499

Case Number	Mis Val	Sel	Actual Group		Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
150			1		1	.9636	.8560	2	.1440	-.5752
152			1		1	.1651	.9860	2	.0140	-1.9177
154			1		1	.1273	.9891	2	.0109	-2.0544
155			1	**	2	.6017	.9346	1	.0654	1.8354
157			2	**	1	.8974	.8117	2	.1883	-.4007
159			1		1	.9720	.8367	2	.1633	-.4945
160			1		1	.9542	.8587	2	.1413	-.5870
161			1		1	.5262	.9462	2	.0538	-1.1634
162			1		1	.8388	.7898	2	.2102	-.3262
164			2		2	.4842	.9520	1	.0480	2.0130
165			1		1	.7746	.9026	2	.0974	-.8159
166			Ungrpd		2	.8823	.8778	1	.1222	1.4615
167			1		1	.3967	.5341	2	.4659	.3178
168			1		1	.6754	.7164	2	.2836	-.1108
169			1	**	2	.8168	.8934	1	.1066	1.5451
171			2		2	.5863	.6672	1	.3328	.7692
172			1		1	.3578	.9675	2	.0325	-1.4492
173			1	**	2	.4546	.5794	1	.4206	.5656
174			1		1	.1772	.9850	2	.0150	-1.8791
175			2		2	.6116	.6819	1	.3181	.8056
176			1		1	.3069	.9729	2	.0271	-1.5514
177			2		2	.2160	.9816	1	.0184	2.5506
180			1		1	.1844	.9844	2	.0156	-1.8569
183			1		1	.7765	.9022	2	.0978	-.8135
188			1		1	.5326	.9452	2	.0548	-1.1537
192			2		2	.2732	.9763	1	.0237	2.4093
194			1	**	2	.5336	.6344	1	.3656	.6910
197			2		2	.2928	.9744	1	.0256	2.3655
198			2		2	.5089	.9486	1	.0514	1.9739
199			1		1	.3242	.9711	2	.0289	-1.5154
206			1		1	.6107	.6814	2	.3186	-.0205
207			1		1	.2344	.9800	2	.0200	-1.7187

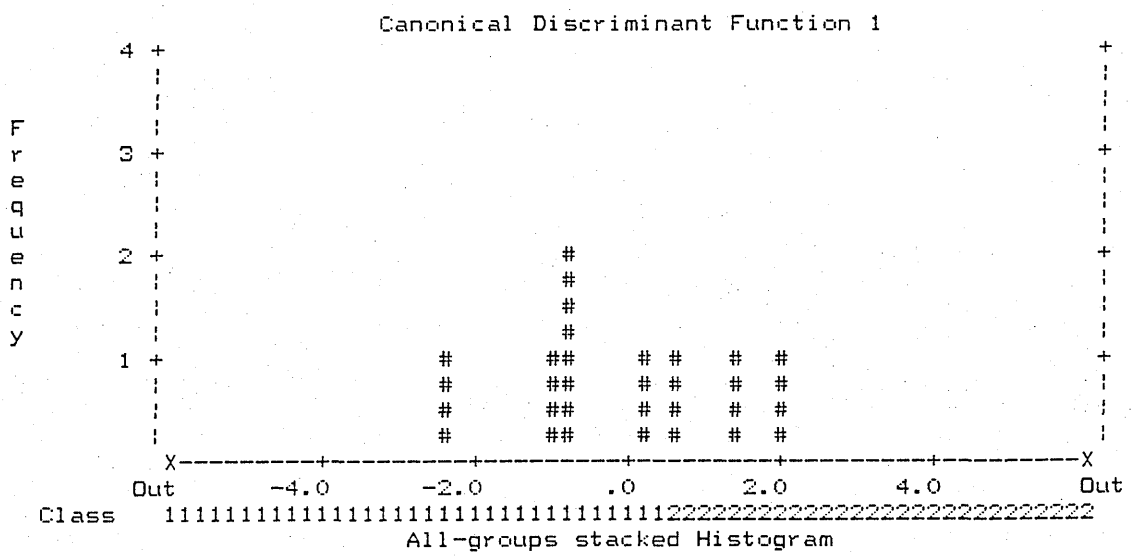
Symbols used in Plots

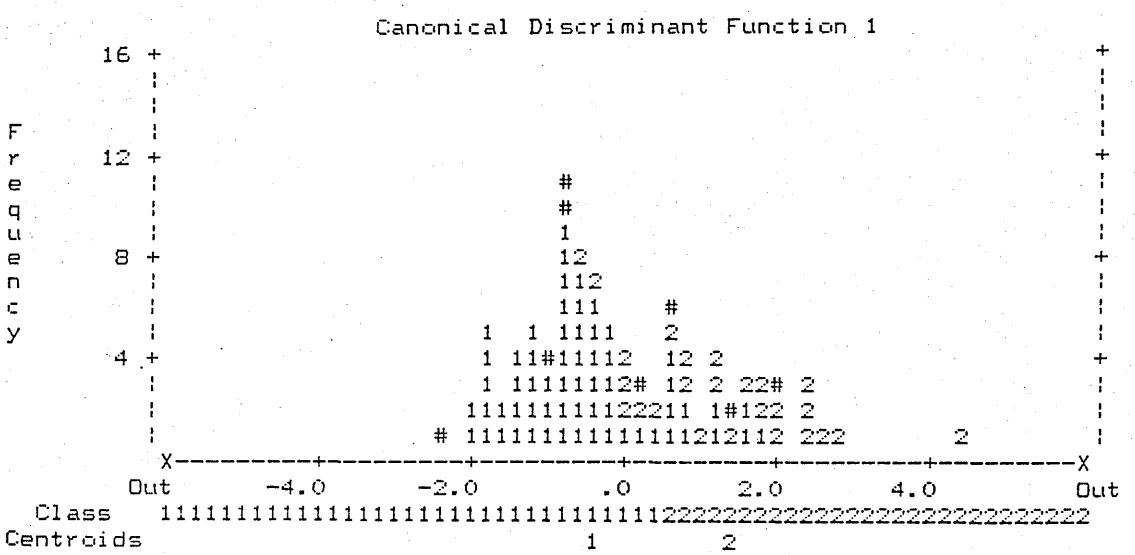
Symbol	Group	Label
1	1	No
2	2	Yes
#		All Ungrouped Cases


Histogram for Group 1 No
Canonical Discriminant Function 1
Frequency
16
12
8
4
Out -4.0 -2.0 .0 2.0 4.0 Out
Class
Centroids
1


Histogram for Group 2 Yes
Canonical Discriminant Function 1
Frequency
4
3
2
1
Out -4.0 -2.0 .0 2.0 4.0 Out
Class
Centroids
2

Histogram for ungrouped cases





SPSS/PC+

Classification Results -

Actual Group	No. of Cases	Predicted Group Membership 1	2
Group 1 No	62	51 82.3%	11 17.7%
Group 2 Yes	25	6 24.0%	19 76.0%
Ungrouped Cases	8	5 62.5%	3 37.5%

Percent of "grouped" cases correctly classified: 80.46%

Classification Processing Summary
224 Cases were processed.
0 Cases were excluded for missing or out-of-range group codes.
129 Cases had at least one missing discriminating variable.
95 Cases were used for printed output.

Appendix D1 - SAVOIR Shell

SAVOIR is an expert system shell of the type known as an advice language. It is designed to produce expert systems which conduct a question and answer session and give advice. It has the facilities to implement many other types of expert system applications.

A SAVOIR model is written by a programmer or knowledge engineer who obtains the information on the subject area from the domain expert. SAVOIR is a batch compiled system. The rules which make up the application are entered into the computer using any normal text editor. They are then complied using the SAVOIR compiler and further checked using the PV check programme which performs a series of checks on the model for consistency and completeness. The outcome of this compilation process is an object model which is represented in an interpretable pseudo code. Then pseudo code is executed by SAVOIR's run time programme.

SAVOIR comes with the facility of a combination of features which include:

- Forward chaining
- Backward chaining
- Demons
- Values held as ranges
- Made variables

Data types:

A SAVOIR's model can be looked at as divided into two parts, a passive and an active part. The passive part of the model describes the expert's domain knowledge whereas the active part describes how he goes about using this knowledge in an advice giving session. There are four types of variable:

NUMBER: Held as a number pair.

PROBABILITY: Held as a pair and an *a priori.*

CONDITION: Either True, False or Unknown.

STRING: Either an alphanumeric string or unknown.

The variables in the inference net can be looked at as forming a series or tree structures, each variable points to the variables from which it is derived. The leaf nodes of these trees are usually questions. Their values can be derived either by asking the user for the values, calling another programme or reading the values from a file or data base.

There are six types of questions in the SAVOIR language:

CERT: Accepts reply on a certainty scale of -5 to 5.

YESNO: Accepts a reply or Y (yes) N (no) or ! (don't know). This reply is converted into a condition.

NUMERIC: Accepts a real number as a reply.

CONFIRM: This is a restricted form of yesno question which only accepts yes as an answer.

INTEGER: A restricted form of the numeric question.

ALPHA: Accepts an alphanumeric string as an answer.

Actions:

The active part of the model is implemented by means of ACTIONS. An action is a group of statements which say 'Do something as soon as some condition becomes true'. Every time the model acquires a new item of information it fully updates its knowledge base so as to enable any relevant actions to be executed as soon as possible.

External function calls:

SAVOIR contains facilities for calling external functions. These are programme modules written in a conventional algorithmic language. Parameters can be passed in both directions.

Appendix D2 - TEDEX programme listing

```
{**************************} { 89-my05.xpt }
{*************************************************************************}

Functions  CertFun(Prob):Num  CondProb(Cond,Cond,Num):Prob  NumProb(Num,Num):Prob
ProbNum(Prob):Num  Member(Num, Num, Num, Num, Num, Num):Prob  Votes(Any):Cond
Cat(String,String):String  DefineWindow(Num ,Num ,Num ,Num ,Num ,Cond ,  Num ,Num
,Num ,Num ,Num ,Cond ) : Null  System(Any) : Null  SField(Num ,Num ,Num ,Num ) : Null
CField(Num ,Num ,Num ) : Null  NField(Num ,Num ,Num ,Num ,Num ) : Null

{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+} INCLUDE mywindo.wdf INCLUDE 89_loade.xpt
{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+} INCLUDE 89_add.xpt
{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+}

CONDITION last_visit_report ' '  MADE CONDITION please_get ' '  MADE CONDITION
please_obtain ' '  MADE CONDITION please_load' '  MADE

CONDITION a_begin' '  MADE CONDITION b_begin' '  MADE CONDITION
c_begin' '  MADE CONDITION clinical_finished ' ' MADE CONDITION clinical_report '
' MADE CONDITION medium_report' '  MADE CONDITION validate_finished ' ' MADE

CONDITION please_save ' '  MADE CONDITION please_sheel ' '  MADE CONDITION
please_store ' '  MADE

STRING f_a_s_who_are_you ' '  MADE STRING m_a_s_who_are_you ' '  MADE

NUMBER m_a_i_user_experience ' ' MADE NUMBER f_a_i_user_experience ' ' MADE

[-----------------------------------------------------------------------]

INVESTIGATE a_c_tedex_user  a_s_who_are_you  a_i_user_experience

ASSOONAS AT_START

MAKE m_a_s_who_are_you  a_s_who_are_you ASSOONAS ANSWERED a_s_who_are_you

MAKE m_a_i_user_experience  a_i_user_experience ASSOONAS  ANSWERED a_i_user_experience

[-----------------------------------------------------------------------]

MAKE a_begin  TRUE

ASSOONAS (ANSWERED a_c_tedex_user AND ANSWERED a_s_who_are_you  AND
ANSWERED a_i_user_experience )

[-----------------------------------------------------------------------] SCRATCHPAD SAVE
(a_s_hospital_number?) CLEAR REPORTLIST STOP ALL CLEAR ALL
```

[MAKE please_get TRUE] MAKE b_begin FALSE [MAKE b_begin TRUE]
MAKE a_begin FALSE MAKE a_begin TRUE

ASSOONAS (a_i_final_menu = 3) [----------]

MAKE please_load FALSE MAKE please_obtain FALSE MAKE please_get FALSE

MAKE validate_finished FALSE MAKE clinical_report FALSE MAKE medium_report
FALSE MAKE clinical_finished FALSE MAKE z_begin FALSE

STOP p_mal_nerve p_mal_muscles

MAKE please_save FALSE MAKE please_sheel FALSE MAKE please_store FALSE

MAKE b_begin TRUE MAKE c_begin FALSE [SCRATCHPAD WIPE
(1 , 200) for the time being this made problems]

ASSOONAS a_begin

[----------]

INVESTIGATE a_i_main_menu a_s_hospital_number?

ASSOONAS b_begin

[----------] MAKE last_visit_report TRUE
ASSOONAS ANSWERED a_i_main_menu AND (a_i_main_menu = 3) AND please_load

DISPLAY REPORTLIST CLEAR REPORTLIST ASSOONAS last_visit_report

ASK a_i_main_menu ASSOONAS last_visit_report AND (a_i_main_menu = 3)

[----------]

DISPLAY 'follow up visit #m_a_s_who_are_you# #m_a_i_user_experience# ' ASSOONAS
(ANSWERED a_i_main_menu AND (a_i_main_menu = 2)) AND please_load

[----------]

MAKE c_begin TRUE ASSOONAS (ANSWERED a_s_hospital_number? AND ANSWERED
a_i_main_menu AND NOT (a_i_main_menu = 4))
[**********]
[---------- LOAD FILE ----------] QUESTION obtain?'ob ' YESNO

MAKE please_load TRUE ASSOONAS please_obtain

```
MAKE please_obtain TRUE SCRATCHPAD LOAD (a_s_hospital_number?) ASSOONAS (please_get
AND ANSWERED a_s_hospital_number? ) OR                    ( ANSWERED obtain?
AND obtain?)

MAKE please_get  TRUE ASSOONAS (   ((a_i_main_menu = 2) OR (a_i_main_menu = 3))
AND ANSWERED a_s_hospital_number? )

[++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++]

 INVESTIGATE  g_history          p_diplopia_symptom_now          p_diplopia_symptom_change
p_diplopia_on_examination_now          g_diplopia_on_examination_change
a_i_proptosis_now          p_proptosis_now          p_proptosis_change          p_snellen_now
p_snellen_change          p_lid_lag          p_lid_retraction          p_lid_eodema_now
p_lid_eodema_change          p_chemosis_now          p_chemosis_change          p_cornea_now
p_cornea_change          n_IOP_dif          a_i_pupill_now          c_coroidal_folds
p_disk_eodima          a_c_any_invest?          i_stop_cont?          c_nerve_invest?
c_field_of_vision?          c_100_hue?          p_test_mal_nerve          g_validate_nerve_answers
c_muscles_invest?          c_Hess_chart?          c_ultra_sound?          c_CTscan?
c_MRIscan?          p_test_mal_muscles          g_validate_muscles_answers          a_i_final_menu

MAKE  last_visit_report FALSE ASSOONAS  c_begin

{**********************************************************************} DISPLAY
REPORTLIST CLEAR REPORTLIST ASSOONAS medium_report

MAKE medium_report    TRUE MAKE clinical_report  TRUE ASSOONAS clinical_finished

MAKE clinical_finished  TRUE ASSOONAS     ANSWERED a_i_disk_eodema
{**********************************************************************}
{---------------------- WHICH WAY TO GO ?----------------------------}

QUESTION a_c_any_invest?'#13,13,13,13,13,13# #13#  Do you have any investigation results
ready?#13# #13# '

YESNO ONLY {.....}

NUMBER i_stop_cont?' stop_cont variable' a_i_stop_cont? IF (ANSWERED a_c_any_invest? AND
NOT a_c_any_invest?) ELSE 2

QUESTION a_i_stop_cont? ' #13# #13,13#  Now ..#13# #13#     The clinical data enquiry is completed
and #13#  no investigation results are available #13#  #13#     Do you want to: #13# #13#    (1) Stop  at
this stage untill you get the #13#      investigation results. #13# OR#13#    (2) Continue without
investigations.'

INTEGER 1  2 ONLY

{.....} CONDITION c_nerve_invest? '  ' a_c_nerve_invest? IF
(ANSWERED a_c_any_invest? AND a_c_any_invest?) ELSE FALSE

QUESTION a_c_nerve_invest?' #13# #13,13,13,13,13,13#  Do you have Optic Nerve function test
results#13#  available?
```

' YESNO ONLY

{.....}

CONDITION c_field_of_vision? ' ' a_c_field_of_vision? IF (ANSWERED c_nerve_invest? AND c_nerve_invest?) ELSE FALSE

DO SYSTEM('cls', 'pause') ASSOONAS (ANSWERED a_c_field_of_vision? AND a_c_field_of_vision?)

QUESTION a_c_field_of_vision?' #13,13,13# Which results are available:#13,13# - Field of vision. #13# #27#[0;30;47m #27#[1;30m- 100-Hue test. #13# #13,13# #27#[0;30;47m Field of vision? (Y/N) ' YESNO ONLY {.....}

CONDITION c_100_hue? ' ' a_c_100_hue? IF (ANSWERED c_nerve_invest? AND c_nerve_invest?) ELSE FALSE

QUESTION a_c_100_hue?' #13,13,13# Which results are available:#13# #13# - Field of vision. #13# - 100-Hue test. #13# #13# #13# 100-Hue test? (Y/N) ' YESNO ONLY

{.....}

CONDITION c_muscles_invest? ' ' a_c_muscles_invest? IF (ANSWERED a_c_any_invest? AND a_c_any_invest?) ELSE FALSE

QUESTION a_c_muscles_invest?' #13# #13# #13,13,13,13,13# Do you have Extraocular Muscle investigation#13# results available?

,

YESNOONLY {.....}

CONDITION c_Hess_chart? ' ' a_c_Hess_chart? IF (ANSWERED a_c_muscles_invest? AND a_c_muscles_invest?) ELSE FALSE

QUESTION a_c_Hess_chart?' #13# #13,13# Which results are available:#13,13# - Hess chart. #13# - Orbital ulrasound. #13# - CT scan. #13# - MRI scan. #13# #13# #13# Hess chart? (Y/N) ' YESNOONLY {.....}

CONDITION c_ultra_sound? ' ' a_c_ultra_sound? IF (ANSWERED a_c_muscles_invest? AND a_c_muscles_invest?) ELSE FALSE

QUESTION a_c_ultra_sound?' #13# #13# #13# Which results are available:#13,13# - Hess chart. #13# - Orbital ulrasound. #13# - CT scan. #13# - MRI scan. #13# #13# #13# Ultrasound? (Y/N) ' YESNO ONLY {.....}

CONDITION c_CTscan? ' ' a_c_CTscan? IF (ANSWERED a_c_muscles_invest? AND a_c_muscles_invest?) ELSE FALSE

QUESTION a_c_CTscan?' #13# #13,13# Which results are available:#13,13# - Hess chart. #13# - Orbital ulrasound. #13# - CT scan. #13# - MRI scan. #13# #13# CT scan? (Y/N) ' YESNO ONLY{.....}

CONDITION c_MRIscan? ' ' a_c_MRIscan? IF (ANSWERED a_c_muscles_invest? AND a_c_muscles_invest?) ELSE FALSE

QUESTION a_c_MRIscan?' #13# #13,13# Which results are available:#13,13# - Hess chart. #13# - Orbital ulrasound. #13# - CT scan. #13# - MRI scan. #13# #13# MRI scan? (Y/N) ' YESNO ONLY

{----------}
{----------} CLEAR REPORTLIST MAKE clinical_report FALSE ASSOONAS validate_finished

MAKE validate_finished TRUE ASSOONAS

(((p_sug_mal_nerve < 0.499) OR (NOT a_c_nerve_invest?) OR ((ANSWERED a_i_field_now OR NOT a_c_field_of_vision?) AND (ANSWERED a_i_100_hue_now OR NOT a_c_100_hue?) AND (NOT c_nerve_sug_test_dif OR (a_i_validate_nerve_answers = 4)))) AND ((p_sug_mal_muscles < 0.499) OR (NOT a_c_muscles_invest?) OR ((ANSWERED a_i_Hess_chart_now OR NOT a_c_Hess_chart?) AND (ANSWERED a_i_ultra_sound OR NOT a_c_ultra_sound?) AND (ANSWERED a_i_CTscan OR NOT a_c_CTscan?) AND (ANSWERED a_i_MRIscan OR NOT a_c_MRIscan?) AND (NOT c_muscles_sug_test_dif OR (a_i_validate_muscles_answers =4))))) OR (ANSWERED a_i_stop_cont? AND (a_i_stop_cont?= 2))
{**********}
{&&&

#13# Optic Nerve: #13# _____ #13# #13# From the clinical examination, #13# there is a highly suggestive #13# evidence that the optic nerve #13# is compressed. '

ASSOONAS(clinical_report) AND((p_sug_mal_nerve > 0.5) AND (p_sug_mal_nerve < 0.699) AND ANSWERED p_sug_mal_nerve)

REPORT (98) ' #13# #13# Investigations are urgently req- #13# uired to confirm this diagnosis #13# before starting the treatment #13# plan. These are 100-Hue, field #13# of vision, ultrasound, MRI and #13# CT scan. '

ASSOONAS (NOT ANSWERED c_show_final_menu) AND clinical_finished AND ((p_sug_mal_nerve > 0.5) AND (p_sug_mal_nerve < 0.699) AND ANSWERED p_sug_mal_nerve)
{??} REPORT (99) ' #13# Optic Nerve: #13# _____ #13# #13# From the clinical data, there #13# a conclusive evidence of optic #13# nerve compression. '

ASSOONAS(clinical_report) AND((p_sug_mal_nerve > 0.7) AND ANSWERED p_sug_mal_nerve)

REPORT (98) ' #13# #13# Investigations are urgently #13# required to confirm this #13# diagnosis before starting the #13# treatment plan, which are #13# 100-Hue, field of vision, #13# ultrasound and CT scan. '

ASSOONAS (last_visit_report AND (nnnn = 4)) OR ((NOT ANSWERED c_show_final_menu) AND clinical_finished AND ((p_sug_mal_nerve > 0.7) AND ANSWERED p_sug_mal_nerve))
{??}

{----------VALIDATION----------}
{----------}

GROUP g_validate_nerve_answers n_sug_mal_nerve n_test_mal_nerve c_nerve_sug_test_dif i_validate_nerve_answers

NUMBER i_validate_nerve_answers ' ' a_i_validate_nerve_answers IF (c_nerve_sug_test_dif AND (ANSWERED a_i_field_now OR ANSWERED a_i_100_hue_now)) ELSE 4

QUESTION a_i_validate_nerve_answers ' #13# #27#[1;5;31m #27#[31m ATTENTION .. ! #13# #27#[30m #13# #27#[0;30;47m #27#[1m Sorry .. there is marked discrepancy #13# between clinical data and test results

#13# Do you think it is necessary to #13# #13# 1 - Repeat the clinical assessment.

#13# 2 - Repeat the investigations. #13,13# 3 - Repeat both. #13# OR #13# 4 - You are satisfied with the results #13# and will continue the session.

#13# #13# #13# ' INTEGER 1 4

[???????] CONDITION c_nerve_sug_test_dif 'to get difference between p_sug_mal_nerve and p_test_mal_nerve ' ((n_sug_mal_nerve - n_test_mal_nerve) = 0.3) OR ((n_test_mal_nerve - n_sug_mal_nerve) = 0.3) [?????????????]

NUMBER n_sug_mal_nerve 'to transfer probability to number n_sug_mal_nerve ' PROBNUM(p_sug_mal_nerve)

[???????]

NUMBER n_test_mal_nerve 'to transfer probability to number ' PROBNUM(p_test_mal_nerve)

{----------RESET & RESTART----------}
{----------} CLEAR a_i_disk_eodema CLEAR a_c_coroidal_folds CLEAR a_i_snellen_now CLEAR a_i_snellen_change {CLEAR a_i_temprac_now} {CLEAR a_i_temprac_change}

CLEAR a_i_validate_nerve_answers

ASSOONAS a_i_validate_nerve_answers = 1

{----------} CLEAR a_i_field_now CLEAR a_i_field_change CLEAR a_i_100_hue_now CLEAR a_i_100_hue_change {CLEAR a_p_charts_comment} CLEAR a_c_color_blind

CLEAR a_i_validate_nerve_answers

ASSOONAS a_i_validate_nerve_answers = 2
{----------}

CLEAR a_i_disk_eodema CLEAR a_c_coroidal_folds CLEAR a_i_snellen_now {CLEAR a_i_snellen_change} {CLEAR a_i_temprac_now} {CLEAR a_i_temprac_change} CLEAR a_i_field_now CLEAR a_i_field_change CLEAR a_i_100_hue_now CLEAR a_i_100_hue_change {CLEAR a_p_charts_comment} CLEAR a_c_color_blind

CLEAR a_i_validate_nerve_answers

ASSOONAS a_i_validate_nerve_answers = 3
{??}
{??} INCLUDE 89_tr.xpt
INCLUDE 89_tr2.xpt

CONDITION anti_all ' ' anti_steroids AND anti_surgery AND anti_radio

{----------}{----------ANTI-STEROIDS START ----------} {----------}
QUESTION a_c_peptic_ulceration ' #13# #13,13,13,13,13# Does the patient have any previous history#13# #13# of peptic ulceration?'

YESNO

```
QUESTION a_c_history_anti_steroids '#13,13,13,13# #13# #13# Does the patient have any
previous side#13,13# effects due to systemic steroid treatment? #13# ' YESNO
{.....} CONDITION anti_steroids ' ' c_anti_steroids

CONDITION c_anti_steroids ' ' ( a_c_peptic_ulceration OR
a_c_history_anti_steroids OR ((a_s_patient_sex =/ 'f') AND (i_patient_age 45)) OR
(a_c_Diabetic?) OR (a_i_thyroid_status = 3) OR a_c_Hypertensive? )

DISPLAY' #13# #13# #13# #13# #13# #27#[1;33m #13# IS SYSTEMIC STEROIDS
#13# #13# CONTRA-INDICATED IN THIS #13# #13# PARTICULAR P
A T I E N T ? #13# ' INVESTIGATE c_anti_steroids ASSOONAS ( (a_i_treat_nerve = 1) OR
((cccc=4) AND (nnnn=4)) ) AND ( validate_finished OR (z_begin[ AND anti_steroids]) )
{.....} DISPLAY ' #13# #13,13# #13# #13# Considerably
high dosese of oral systemic steroids#13# are usually required in such case (120 milligrams of#13#
prednisolone or equivalent is the usual starting dose).#13,13# It is recommend that a physican should
be involved#13# in patient management.#13,13,27#[31m#13,13,13# Note: This high dose can only
be given to the#13# patient while in hospital.'

ASSOONAS ( (a_i_treat_nerve = 1) OR ((cccc=4) AND (nnnn=4)) ) AND NOT c_anti_steroids
AND ( validate_finished OR (z_begin[ AND anti_steroids]) )

{.....}

STRING s_Diabetic ' ' #13# - Diabetic. ' IF (ANSWERED a_c_diabetic?) AND (a_c_diabetic?)
ELSE ' '

STRING s_Hyper_tensive ' ' #13# - Hypertensive.' IF (ANSWERED a_c_Hypertensive?) AND
(a_c_Hypertensive?) ELSE ' '

STRING s_female_over45 ' ' #13# - being at risk of oteoporosis.' IF (ANSWERED a_s_patient_sex)
AND (ANSWERED i_patient_age) AND ((a_s_patient_sex =/ 'f') AND (i_patient_age 45))
ELSE ' '

STRING s_steroids_side_effect ' ' #13# - the presence of previous steroid treatment #13# side
effects.' IF (ANSWERED a_c_history_anti_steroids) AND a_c_history_anti_steroids ELSE ' '

STRING s_peptic_ulceration ' ' #13# - the risk of bleeding or perforation of the #13# peptic ulcer.'
IF (ANSWERED a_c_peptic_ulceration) AND a_c_peptic_ulceration ELSE ' '

DISPLAY'#13# #13# #13# In this particular patient it is preferred #13# not to use systemic
steroids and to consider #13# other options if possible. As the patient#s_Diabetic#
#s_thyroid_status##s_Hyper_tensive##s_female_over45##s_steroids_side_effect##s_peptic_ulceration#
#13# #13# The availability of other options and your #13# judgements should be the deceicive
```

```
factors #13#  in reaching the final decision. #13# ' ASSOONAS  ( (a_i_treat_nerve = 1)  OR
((cccc=4) AND (nnnn=4)) ) AND  c_anti_steroids AND  ( validate_finished OR
(z_begin[ AND anti_steroids]) )  AND (NOT anti_all)

{----------}{---------- ANTI-STEROIDS
END ----------} {----------}

{----------}{---------- ANTI-SURGERY
START----------} {----------}

QUESTION a_c_contra_anasthesia? '#13,13,13,13,13# #13#  Are there any contra-indications #13#
#13#  for surgery under general anasthesia? '

YESNO ONLY

{.....}

CONDITION anti_surgery ' ' c_anti_surgery

CONDITION c_anti_surgery ' '  a_c_contra_anasthesia?

INVESTIGATE  c_anti_surgery ASSOONAS  ( (a_i_treat_nerve = 2)  OR  (a_i_lid_tars_leng_deco = 3)
) OR ( c_muscles_troubles AND (NOT c_any_other_troubles)  AND (ANSWERED c_stable AND
c_stable)  )  AND  ( validate_finished OR (z_begin[ AND anti_surgery]) )

{.....} DISPLAY '#13,13,13,13,13,13# #13#  Apperantly
there is no contraindications to #13#  orbital surgical decompression. '

ASSOONAS  ( (a_i_treat_nerve = 2)  OR  (a_i_lid_tars_leng_deco = 3) ) AND  NOT
c_anti_surgery AND  ( validate_finished OR (z_begin[ AND anti_surgery]) )

{.....} DISPLAY ' #13,13,13,13,13,13# #13#
Apperantly there are contraindications to #13#  to orbital surgical decompression. It is #13#
recommended to use alternative treatment #13#  modaliy. '

ASSOONAS  ( (a_i_treat_nerve = 2)  OR  (a_i_lid_tars_leng_deco = 3 ) ) AND  c_anti_surgery
AND  ( validate_finished OR (z_begin[ AND anti_surgery]) )  AND (NOT anti_all)
{----------}{---------- ANTI-SURGERY
END ----------} {----------}

{----------}{----------
ANTI-RADIOTHERAPY START----------}
{----------} CONDITION anti_radio ' ' c_anti_radio

CONDITION c_anti_radio '  ' ( (a_c_Radiotherapy?) AND NOT (a_i_Radiotherapy_effect? = 1 ) )

INVESTIGATE  c_anti_radio ASSOONAS((a_i_treat_nerve = 3) OR ( (cccc=4)AND(nnnn=4)AND
anti_steroids))AND  ( validate_finished OR (z_begin[ AND anti_radio]))
{.....}

DISPLAY ' #13,13,13,13,13,13# #13#  Apparently there are no contraindications #13#  to Orbital
Radiotherapy in thid particular #13#  patient. ' ASSOONAS((a_i_treat_nerve = 3)OR ( (cccc=4) AND
```

(nnnn=4) AND anti_steroids))AND NOT c_anti_radio AND (validate_finished OR (z_begin[AND anti_radio]))

{.....}

DISPLAY ' #13# #13# #13,13,13# #13# #13# #13# This patient had previous unsuccessful Orbital #13# Radiotherapy course. Therefore, radiotherapy #13# should not be repeated.

' ASSOONAS((a_i_treat_nerve = 3)OR ((cccc=4)AND(nnnn=4)AND anti_steroids))AND c_anti_radio AND (validate_finished OR (z_begin[AND anti_radio])) AND (NOT anti_all) {----------} {---------- ANTI-RADIOTHERAPY END ----------}
{----------}

{??}

{&&&

REPORT (90)' #13# #13# The following investigations are #13# strongly required to confirm this #13# diagnosis before starting the #13# treatment plan: Hess chart, Field #13# of single binocular vision. '

ASSOONAS (NOT ANSWERED c_show_final_menu) AND clinical_finished AND ((p_sug_mal_muscles > 0.5) AND (p_sug_mal_muscles < 0.699) AND ANSWERED p_sug_mal_muscles)

{??} REPORT (91) ' #13# #13# Extraocular Muscles: #13# _____ #13# #13# The clinical data provides a #13# conclusive evidence of extraocular #13# muscles dysfunction. '

ASSOONAS(clinical_report) AND((p_sug_mal_muscles > 0.7) AND ANSWERED p_sug_mal_muscles)

REPORT (90)' #13# #13# The following investiggations are #13# required: Hess chart, Field of #13# single binocular vision. '

ASSOONAS (NOT ANSWERED c_show_final_menu) AND clinical_finished AND ((p_sug_mal_muscles > 0.7) AND ANSWERED p_sug_mal_muscles)
{??} GROUP g_validate_muscles_answers n_sug_mal_muscles n_test_mal_muscles c_muscles_sug_test_dif i_validate_muscles_answers

NUMBER i_validate_muscles_answers ' ' a_i_validate_muscles_answers IF (c_muscles_sug_test_dif AND (ANSWERED a_i_Hess_chart_now OR ANSWERED a_i_ultra_sound OR ANSWERED a_i_CTscan OR ANSWERED a_i_MRIscan)) ELSE 4

QUESTION a_i_validate_muscles_answers '#27#[1m #13# #27#[5m #27#[31mA T T E N T I O N ..! #13,27#[0;30;47m #13,27#[30;47m Sorry .. there is marked discrepancy #13,27#[0;30;47m between clinical#27#[5;47m data and test results. #13# #13# Do you think it is necessary to: #13# #13# (1) Repeat the clinical assessment. #13# #13# (2) Repeat the investigations. #13,13# (3) Repeat both. #13# OR #13# (4) You are satisfied with the results, #13# and continue the session. #13# #13# ' INTEGER 1 4

[????????] CONDITION c_muscles_sug_test_dif 'to get difference between p_sug_mal_muscles and p_test_mal_muscles ' ((n_sug_mal_muscles - n_test_mal_muscles) = 0.3) OR ((n_test_mal_muscles - n_sug_mal_muscles) = 0.3) [??????????????]

NUMBER n_sug_mal_muscles 'to transfer probability to number n_sug_mal_muscles ' PROBNUM(p_sug_mal_muscles)

[????????]

NUMBER n_test_mal_muscles 'to transfer probability to number ' PROBNUM(p_test_mal_muscles)

```
{----------RESET & RESTART----------}
{------------------------------------------------------------------}

CLEAR a_i_diplopia_symptom_now CLEAR a_i_diplopia_symptom_change CLEAR
a_i_diplopia_on_examination_now CLEAR a_i_diplopia_on_examination_change CLEAR
a_i_proptosis_opinion CLEAR a_i_proptosis_now CLEAR a_i_proptosis_change

CLEAR a_i_validate_muscles_answers

ASSOONAS a_i_validate_muscles_answers = 1
{------------------------------------------------------------------}

CLEAR a_i_Hess_chart_now CLEAR a_i_Hess_chart_change CLEAR a_i_ultra_sound CLEAR
a_i_CTscan CLEAR a_i_MRIscan

CLEAR a_i_validate_muscles_answers

ASSOONAS a_i_validate_muscles_answers = 2
{------------------------------------------------------------------}

CLEAR a_i_diplopia_symptom_now CLEAR a_i_diplopia_symptom_change CLEAR
a_i_diplopia_on_examination_now CLEAR a_i_diplopia_on_examination_change CLEAR
a_i_proptosis_opinion CLEAR a_i_proptosis_now CLEAR a_i_proptosis_change CLEAR
a_i_Hess_chart_now CLEAR a_i_Hess_chart_change CLEAR a_i_ultra_sound CLEAR a_i_CTscan
CLEAR a_i_MRIscan

CLEAR a_i_validate_muscles_answers

ASSOONAS a_i_validate_muscles_answers = 3
{??????????????????????????????????????????????????????????????????}
{??????????????????????????????????????????????????????????????????}
{$$$$$$$$$$$$$$$$$$$$$$$$$$}                {$$$$$$$$$$$$$$$$$$}
{$$$$$$$$$$$$$$$$$$$$$$$$$$}

REPORT(96)' #13# #13#  Cornea: #13#  _____ #13# #13#  Normal cornea. '

ASSOONAS(clinical_report)                AND (      ANSWERED p_mal_cornea  AND (
p_mal_cornea < 0.299 )                  )

REPORT(96) ' #13# #13#  Cornea: #13#  _____ #13# #13#  Superficial Punctate Keratopathy. '

ASSOONAS(clinical_report)                AND (      ANSWERED p_mal_cornea  AND
(p_mal_cornea > 0.3)                AND (p_mal_cornea < 0.499)                  )
REPORT(96) ' #13# #13#  Cornea: #13#  _____ #13# #13#  Exposure problem. '

ASSOONAS(clinical_report)                AND (      ANSWERED p_mal_cornea AND
(p_mal_cornea > 0.5 )                AND  (p_mal_cornea < 0.699)                  )
```

```
REPORT(96)' #13# #13#  Cornea: #13#  _____ #13# #13#  Ulceration. '
ASSOONAS(clinical_report)                    AND (      ANSWERED p_mal_cornea  AND (
p_mal_cornea > 0.7 )                    )

{$$$
```

{---------- patient personal information ----------} {10 - 19}

STRING f_a_s_patient_name ' 'MADE NUMBER f_a_i_patient_DOB ' 'MADE STRING
f_a_s_patient_sex ' 'MADE

{---------- general health (history) ----------}

{20 - 39}

CONDITION f_a_c_Diabetic? ' 'MADE CONDITION f_a_c_Hypertensive? '
'MADE CONDITION f_a_c_Renal? ' 'MADE CONDITION f_a_c_Pulmonaric? '
'MADE CONDITION f_a_c_GI? ' 'MADE CONDITION f_a_c_peptic_ulceration '
'MADE CONDITION f_a_c_history_anti_steroids ' 'MADE CONDITION
f_a_c_contra_anasthesia? ' 'MADE CONDITION f_a_c_Hart_disease ' 'MADE

{---------- history of thyroid treatment ----------}

{40 - 49}

NUMBER f_a_i_thyroid_status ' 'MADE CONDITION f_a_c_Radioactive_iodine? ' 'MADE
CONDITION f_a_c_Thyroidectomy? ' 'MADE CONDITION f_a_c_Carbimazol? ' 'MADE

{---------- eye troubles and complains ----------}

{50 - 69}

CONDITION f_a_c_lacrimination? ' 'MADE CONDITION f_a_c_photophobia? '
'MADE CONDITION f_a_c_visual_blurring? ' 'MADE CONDITION f_a_c_double_vision?
' 'MADE CONDITION f_a_c_pain? ' 'MADE NUMBER
f_a_i_patient_most_troublesome ' 'MADE NUMBER f_a_i_patient_appearance ' 'MADE

{---------- previous eye treatment ----------}

{70 - 99}

NUMBER f_a_i_eye_disease_duration ' 'MADE CONDITION f_a_c_Eye_lubricants? '
'MADE CONDITION f_a_c_Tr_for_corneal_ulcer? ' 'MADE CONDITION
f_a_c_Lid_lengthening? ' 'MADE CONDITION f_a_c_Tarsorhaphy? ' 'MADE
CONDITION f_a_c_Systemic_steroids? ' 'MADE CONDITION f_a_c_Radiotherapy? '
'MADE CONDITION f_a_c_decompression? ' 'MADE CONDITION f_a_c_Prisms_occlusion?
' 'MADE CONDITION f_a_c_Muscle_surgery? ' 'MADE

{ CONDITION f_a_c_lubricants_effect ' 'MADE CONDITION f_a_c_Tr_ulcer_effect '
'MADE CONDITION f_a_c_Lid_lengthening_effect ' 'MADE CONDITION
f_a_c_Tarsorahphy_effect ' 'MADE CONDITION f_a_c_Systemic_steroids_effect ' 'MADE
CONDITION f_a_c_Radiotherapy_effect ' 'MADE CONDITION f_a_c_decompression_effect
' 'MADE CONDITION f_a_c_Prisms_occlussion_effect ' 'MADE CONDITION
f_a_c_Muscles_surgery_effect ' 'MADE}

{---------- clinical examinations ----------}

```
NUMBER    f_a_i_disk_eodema          ' 'MADE CONDITION  f_a_c_coroidal_folds          '
'MADE NUMBER    f_a_i_snellen_now          ' 'MADE NUMBER    f_a_i_field_now          '
'MADE NUMBER    f_a_i_100_hue_now          ' 'MADE CONDITION  f_a_c_color_blind
' 'MADE NUMBER  f_a_i_diplopia_symptom_now       ' 'MADE NUMBER
f_a_i_diplopia_on_examination_now ' 'MADE NUMBER    f_a_i_proptosis_opinion       ' 'MADE
NUMBER    f_a_i_proptosis_now          ' 'MADE NUMBER    f_a_i_Hess_chart_now          '
'MADE NUMBER    f_a_i_ultra_sound          ' 'MADE CONDITION  f_a_c_lid_lag          '
'MADE NUMBER    f_a_i_lid_retraction          ' 'MADE NUMBER    f_a_i_cornea_now
' 'MADE NUMBER    f_a_i_lid_eodema_now          ' 'MADE NUMBER    f_a_i_chemosis_now
' 'MADE NUMBER    f_n_IOP_dif                ' 'MADE

{----------FINDINGS ----------}      {130 - 140 }

NUMBER  f_m_i_nerve_condition    ' 'MADE NUMBER  f_m_i_muscles_condition    ' 'MADE
NUMBER  f_m_i_cornea_condition    ' 'MADE NUMBER  f_m_i_lid_condition      ' 'MADE

NUMBER  m_i_nerve_condition    ' 'MADE NUMBER  m_i_muscles_condition    ' 'MADE
NUMBER  m_i_cornea_condition    ' 'MADE NUMBER  m_i_lid_condition      ' 'MADE

{---------- REQUIRED INVESTIGATIONS ----------}      { 140 -160}

CONDITION  f_m_c_field_of_vision       ' 'MADE CONDITION  f_m_c_100_hue_test          '
'MADE CONDITION  f_m_c_Hess_chart          ' 'MADE CONDITION  f_m_c_ultra_sound
' 'MADE

[              ' 'MADE              ' 'MADE     ]

CONDITION  m_c_field_of_vision    ' 'MADE CONDITION  m_c_100_hue_test          ' 'MADE
CONDITION  m_c_Hess_chart          ' 'MADE CONDITION  m_c_ultra_sound          '
'MADE

{---------- ACTIONS ----------}      { 160 -165}

NUMBER  f_m_i_action  ' 'MADE

NUMBER  m_i_action  ' 'MADE

{---------- MEDICAL TREATMENT ----------}      { 165 - 180 }

CONDITION  f_m_c_eye_lubricants          ' 'MADE CONDITION  f_m_c_systemic_steroids
' 'MADE CONDITION  f_m_c_raise_head_w_dioretics      ' 'MADE CONDITION
f_m_c_raise_head_w_no_dioretics    ' 'MADE CONDITION  f_m_c_occlusion_or_prism          '
'MADE CONDITION  f_m_c_Radiotherapy          ' 'MADE CONDITION
f_m_c_anti_glaucoma_medications    ' 'MADE

CONDITION  m_c_eye_lubricants          ' 'MADE CONDITION  m_c_systemic_steroids
' 'MADE CONDITION  m_c_raise_head_w_dioretics      ' 'MADE CONDITION
m_c_raise_head_w_no_dioretics    ' 'MADE CONDITION  m_c_occlusion_or_prism          '
'MADE CONDITION  m_c_Radiotherapy          ' 'MADE CONDITION
m_c_anti_glaucoma_medications    ' 'MADE

{---------- SURGICAL TREATMENT ----------}      { 180 - 190 }
```

CONDITION f_m_c_tarsoraphy ' 'MADE CONDITION f_m_c_lid_lenghthen ' 'MADE
CONDITION f_m_c_decompression ' 'MADE CONDITION f_m_c_muscles_surgery ' 'MADE

CONDITION m_c_tarsoraphy ' 'MADE CONDITION m_c_lid_lenghthen ' 'MADE
CONDITION m_c_decompression ' 'MADE CONDITION m_c_muscles_surgery ' 'MADE

{&&&

GET (90, f_a_c_Radiotherapy_effect) SCRATCHPAD GET (91, f_a_c_decompression_effect) SCRATCHPAD GET (92, f_a_c_Prisms_occlusion_effect) SCRATCHPAD GET (93, f_a_c_Muscles_surgery_effect) ASSOONAS please_load }

[SCRATCHPAD GET ()]

{---------- clinical examinations ----------}

SCRATCHPAD GET (100, f_a_i_disk_eodema) SCRATCHPAD GET (101, f_a_c_coroidal_folds) SCRATCHPAD GET (102, f_a_i_snellen_now) SCRATCHPAD GET (103, f_a_i_field_now) SCRATCHPAD GET (104, f_a_i_100_hue_now) SCRATCHPAD GET (105, f_a_c_color_blind) SCRATCHPAD GET (106, f_a_i_diplopia_symptom_now) SCRATCHPAD GET (107, f_a_i_diplopia_on_examination_now) SCRATCHPAD GET (108, f_a_i_proptosis_opinion) SCRATCHPAD GET (109, f_a_i_proptosis_now) SCRATCHPAD GET (110, f_a_i_Hess_chart_now) SCRATCHPAD GET (111, f_a_i_ultra_sound) SCRATCHPAD GET (112, f_a_c_lid_lag) SCRATCHPAD GET (113, f_a_i_lid_retraction) SCRATCHPAD GET (114, f_a_i_cornea_now) SCRATCHPAD GET (115, f_a_i_lid_eodema_now) SCRATCHPAD GET (116, f_a_i_chemosis_now) SCRATCHPAD GET (117, f_n_IOP_dif) ASSOONAS please_load {UP T0 150}

{----------FINDINGS ----------} {130 - 140 }

SCRATCHPAD GET (130, f_m_i_nerve_condition) SCRATCHPAD GET (131, f_m_i_muscles_condition) SCRATCHPAD GET (132, f_m_i_cornea_condition) SCRATCHPAD GET (133, f_m_i_lid_condition) ASSOONAS please_load {---------- REQUIRED INVESTIGATIONS ----------} {140 -160}

SCRATCHPAD GET (140, f_m_c_field_of_vision) SCRATCHPAD GET (141, f_m_c_100_hue_test) SCRATCHPAD GET (142, f_m_c_Hess_chart) SCRATCHPAD GET (143, f_m_c_ultra_sound) ASSOONAS please_load {---------- ACTIONS ----------} {160 -165}

SCRATCHPAD GET (160, f_m_i_action) ASSOONAS please_load {---------- MEDICAL TREATMENT ----------} {165 - 180 }

SCRATCHPAD GET (165, f_m_c_eye_lubricants) SCRATCHPAD GET (166, f_m_c_systemic_steroids) SCRATCHPAD GET (167, f_m_c_raise_head_w_dioretics) SCRATCHPAD GET (168, f_m_c_raise_head_w_no_dioretics) SCRATCHPAD GET (169, f_m_c_occlusion_or_prism) SCRATCHPAD GET (170, f_m_c_Radiotherapy) SCRATCHPAD GET (171, f_m_c_anti_glaucoma_medications) ASSOONAS please_load {---------- SURGICAL TREATMENT ----------} { 180 - 190 }

SCRATCHPAD GET (180, f_m_c_tarsoraphy) SCRATCHPAD GET (181, f_m_c_lid_lenghthen) SCRATCHPAD GET (182, f_m_c_decompression) SCRATCHPAD GET (183, f_m_c_muscles_surgery) ASSOONAS please_load

{----------}{---------- user personal information ----------}

MAKE f_a_s_who_are_you a_s_who_are_you MAKE f_a_i_user_experience a_i_user_experience ASSOONAS please_save

SCRATCHPAD PUT (3, f_a_s_who_are_you) SCRATCHPAD PUT (4, f_a_i_user_experience) ASSOONAS please_sheel

{---------- patient personal information ----------} {10 - 19}

MAKE f_a_s_patient_name a_s_patient_name MAKE f_a_i_patient_DOB a_i_patient_DOB
MAKE f_a_s_patient_sex a_s_patient_sex ASSOONAS please_save

SCRATCHPAD PUT (10,f_a_s_patient_name) SCRATCHPAD PUT (11,f_a_i_patient_DOB)
SCRATCHPAD PUT (13,f_a_s_patient_sex) ASSOONAS please_sheel

{---------- general health (history) ----------}

{20 - 39}

{MAKE f_a_i_thyroid_status a_i_thyroid_status} MAKE f_a_c_Diabetic? a_c_Diabetic?
MAKE f_a_c_Hypertensive? a_c_Hypertensive? MAKE f_a_c_Renal? a_c_Renal? MAKE
f_a_c_Pulmonaric? a_c_Pulmonaric? MAKE f_a_c_GI? a_c_GI? MAKE
f_a_c_peptic_ulceration a_c_peptic_ulceration MAKE f_a_c_history_anti_steroids
a_c_history_anti_steroids MAKE f_a_c_contra_anasthesia? a_c_contra_anasthesia?
MAKE f_a_c_Hart_disease a_c_Hart_disease ASSOONAS please_save

{SCRATCHPAD PUT (20,f_a_i_thyroid_status)} SCRATCHPAD PUT (21,f_a_c_Diabetic?)
SCRATCHPAD PUT (22,f_a_c_Hypertensive?) SCRATCHPAD PUT (23,f_a_c_Renal?)
SCRATCHPAD PUT (24,f_a_c_Pulmonaric?) SCRATCHPAD PUT (25,f_a_c_GI?) SCRATCHPAD
PUT (26,f_a_c_peptic_ulceration) SCRATCHPAD PUT (27,f_a_c_history_anti_steroids)
SCRATCHPAD PUT (28,f_a_c_contra_anasthesia?) SCRATCHPAD PUT (29,f_a_c_Hart_disease)
ASSOONAS please_sheel

{up to 39}

{---------- history of thyroid treatment ----------}

{40 - 49}

MAKE f_a_i_thyroid_status a_i_thyroid_status MAKE f_a_c_Radioactive_iodine?
a_c_Radioactive_iodine? MAKE f_a_c_Thyroidectomy? a_c_Thyroidectomy? MAKE
f_a_c_Carbimazol? a_c_Carbimazol? ASSOONAS please_save

SCRATCHPAD PUT (40,f_a_i_thyroid_status) SCRATCHPAD PUT (41,f_a_c_Radioactive_iodine?)
SCRATCHPAD PUT (42,f_a_c_Thyroidectomy?) SCRATCHPAD PUT (43,f_a_c_Carbimazol?)
ASSOONAS please_sheel

{---------- eye troubles and complains ----------}

{50 - 69}

MAKE f_a_c_lacrimination? a_c_lacrimination? MAKE f_a_c_photophobia?
a_c_photophobia? MAKE f_a_c_visual_blurring? a_c_visual_blurring? MAKE
f_a_c_double_vision? a_c_double_vision? MAKE f_a_c_pain? a_c_pain? MAKE
f_a_i_patient_most_troublesome a_i_patient_most_troublesome MAKE f_a_i_patient_appearance
a_i_patient_appearance ASSOONAS please_save

SCRATCHPAD PUT (50,f_a_c_lacrimination?) SCRATCHPAD PUT (51,f_a_c_photophobia?)
SCRATCHPAD PUT (52,f_a_c_visual_blurring?) SCRATCHPAD PUT (53,f_a_c_double_vision?)
SCRATCHPAD PUT (54,f_a_c_pain?) SCRATCHPAD PUT (55,f_a_i_patient_most_troublesome)
SCRATCHPAD PUT (56,f_a_i_patient_appearance) ASSOONAS please_sheel

{---------- previous eye treatment ----------}

{70 - 99}

MAKE f_a_i_eye_disease_duration a_i_eye_disease_duration

MAKE f_a_c_Eye_lubricants? (a_c_Eye_lubricants? OR c_tr_ulcer_lubrication
OR c_tr_cornea_lid_lubrication)

MAKE f_a_c_Tr_for_corneal_ulcer? (a_c_Tr_for_corneal_ulcer? OR c_tr_ulcer OR
c_tr_ulcer_lubrication)

MAKE f_a_c_Lid_lengthening? (a_c_Lid_lengthening? OR c_tr_lid_lengthening)

MAKE f_a_c_Tarsorhaphy? (a_c_Tarsorhaphy? OR c_tr_tarsoraphy)

MAKE f_a_c_Systemic_steroids? (a_c_Systemic_steroids? OR c_tr_ulc_nerv_w_steroids OR
c_tr_ulc_nerv_critical OR c_tr_nerve_w_steroids)

MAKE f_a_c_Radiotherapy? (a_c_Radiotherapy? OR c_tr_ulc_nerv_w_radiotherapy
OR c_tr_nerve_w_radiotherapy)

MAKE f_a_c_decompression? (a_c_decompression? OR c_tr_nerve_w_decompression OR
c_tr_lid_drcompress OR c_do_deco_first_muscles)

MAKE f_a_c_Prisms_occlusion? (a_c_Prisms_occlusion? OR c_prism_or_occlussion)

MAKE f_a_c_Muscle_surgery? (a_c_Muscle_surgery? OR c_do_muscles_surgery
OR c_do_muscles_surgery_w_care)

ASSOONAS please_save

SCRATCHPAD PUT (70, f_a_i_eye_disease_duration) SCRATCHPAD PUT (71,
f_a_c_Eye_lubricants?) SCRATCHPAD PUT (72, f_a_c_Tr_for_corneal_ulcer?) SCRATCHPAD PUT
(73, f_a_c_Lid_lengthening?) SCRATCHPAD PUT (74, f_a_c_Tarsorhaphy?) SCRATCHPAD PUT (75,
f_a_c_Systemic_steroids?) SCRATCHPAD PUT (76, f_a_c_Radiotherapy?) SCRATCHPAD PUT (77,
f_a_c_decompression?) SCRATCHPAD PUT (78, f_a_c_Prisms_occlusion?) SCRATCHPAD PUT (79,
f_a_c_Muscle_surgery?) ASSOONAS please_sheel

{ MAKE f_a_c_lubricants_effect a_c_lubricants_effect MAKE f_a_c_Tr_ulcer_effect
a_c_Tr_ulcer_effect MAKE f_a_c_Lid_lengthening_effect a_c_Lid_lengthening_effect MAKE
f_a_c_Tarsorahphy_effect a_c_Tarsorahphy_effect MAKE f_a_c_Systemic_steroids_effect
a_c_Systemic_steroids_effect MAKE f_a_c_Radiotherapy_effect a_c_Radiotherapy_effect MAKE
f_a_c_decompression_effect a_c_decompression_effect MAKE f_a_c_Prisms_occlussion_effect
a_c_Prisms_occlussion_effect MAKE f_a_c_Muscles_surgery_effect a_c_muscles_surgery_effect
ASSOONAS please_save

SCRATCHPAD PUT (85, f_a_c_lubricants_effect) SCRATCHPAD PUT (86, f_a_c_Tr_ulcer_effect)
SCRATCHPAD PUT (87, f_a_c_Lid_lengthening_effect) SCRATCHPAD PUT (88,
f_a_c_Tarsorhaphy_effect) SCRATCHPAD PUT (89, f_a_c_Systemic_steroids_effect) SCRATCHPAD
PUT (90, f_a_c_Radiotherapy_effect) SCRATCHPAD PUT (91, f_a_c_decompression_effect)
SCRATCHPAD PUT (92, f_a_c_Prisms_occlusion_effect) SCRATCHPAD PUT (93,
f_a_c_Muscles_surgery_effect) ASSOONAS please_sheel }

[SCRATCHPAD PUT 0]

{---------- clinical examinations ----------}

MAKE f_a_i_disk_eodema a_i_disk_eodema MAKE f_a_c_coroidal_folds
a_c_coroidal_folds MAKE f_a_i_snellen_now a_i_snellen_now MAKE f_a_i_field_now
a_i_field_now MAKE f_a_i_100_hue_now a_i_100_hue_now MAKE f_a_c_color_blind
a_c_color_blind MAKE f_a_i_diplopia_symptom_now a_i_diplopia_symptom_now MAKE
f_a_i_diplopia_on_examination_now a_i_diplopia_on_examination_now MAKE
f_a_i_proptosis_opinion a_i_proptosis_opinion MAKE f_a_i_proptosis_now
a_i_proptosis_now MAKE f_a_i_Hess_chart_now a_i_Hess_chart_now MAKE
f_a_i_ultra_sound a_i_ultra_sound MAKE f_a_c_lid_lag a_c_lid_lag MAKE
f_a_i_lid_retraction a_i_lid_retraction MAKE f_a_i_cornea_now a_i_cornea_now
MAKE f_a_i_lid_eodema_now a_i_lid_eodema_now MAKE f_a_i_chemosis_now
a_i_chemosis_now MAKE f_n_IOP_dif n_IOP_dif ASSOONAS please_save

SCRATCHPAD PUT (100, f_a_i_disk_eodema) SCRATCHPAD PUT (101, f_a_c_coroidal_folds)
SCRATCHPAD PUT (102, f_a_i_snellen_now) SCRATCHPAD PUT (103, f_a_i_field_now)
SCRATCHPAD PUT (104, f_a_i_100_hue_now) SCRATCHPAD PUT (105, f_a_c_color_blind)
SCRATCHPAD PUT (106, f_a_i_diplopia_symptom_now) SCRATCHPAD PUT (107,
f_a_i_diplopia_on_examination_now) SCRATCHPAD PUT (108, f_a_i_proptosis_opinion)
SCRATCHPAD PUT (109, f_a_i_proptosis_now) SCRATCHPAD PUT (110, f_a_i_Hess_chart_now)
SCRATCHPAD PUT (111, f_a_i_ultra_sound) SCRATCHPAD PUT (112, f_a_c_lid_lag)
SCRATCHPAD PUT (113, f_a_i_lid_retraction) SCRATCHPAD PUT (114, f_a_i_cornea_now)
SCRATCHPAD PUT (115, f_a_i_lid_eodema_now) SCRATCHPAD PUT (116, f_a_i_chemosis_now)
SCRATCHPAD PUT (117, f_n_IOP_dif) ASSOONAS please_sheel

{UP TO 150}

{----------FINDINGS ----------} {130 - 140 }

MAKE f_m_i_nerve_condition m_i_nerve_condition MAKE f_m_i_muscles_condition
m_i_muscles_condition MAKE f_m_i_cornea_condition m_i_cornea_condition MAKE
f_m_i_lid_condition m_i_lid_condition ASSOONAS please_save

SCRATCHPAD PUT (130, f_m_i_nerve_condition) SCRATCHPAD PUT (131,
f_m_i_muscles_condition) SCRATCHPAD PUT (132, f_m_i_cornea_condition) SCRATCHPAD PUT
(133, f_m_i_lid_condition) ASSOONAS please_sheel

{---------- REQUIRED INVESTIGATIONS ----------} { 140 -160}

MAKE f_m_c_field_of_vision m_c_field_of_vision MAKE f_m_c_100_hue_test
m_c_100_hue_test MAKE f_m_c_Hess_chart m_c_Hess_chart MAKE f_m_c_ultra_sound
m_c_ultra_sound ASSOONAS please_save

{ MAKE MAKE }

SCRATCHPAD PUT (140, f_m_c_field_of_vision) SCRATCHPAD PUT (141, f_m_c_100_hue_test)
SCRATCHPAD PUT (142, f_m_c_Hess_chart) SCRATCHPAD PUT (143, f_m_c_ultra_sound)
ASSOONAS please_sheel

{---------- ACTIONS ----------} { 160 -165}

MAKE f_m_i_action m_i_action ASSOONAS please_save

SCRATCHPAD PUT (160, f_m_i_action) ASSOONAS please_sheel

{---------- MEDICAL TREATMENT ----------} { 165 - 180 }

MAKE f_m_c_eye_lubricants m_c_eye_lubricants MAKE f_m_c_systemic_steroids m_c_systemic_steroids MAKE f_m_c_raise_head_w_dioretics m_c_raise_head_w_dioretics MAKE f_m_c_raise_head_w_no_dioretics m_c_raise_head_w_no_dioretics MAKE f_m_c_occlusion_or_prism m_c_occlusion_or_prism MAKE f_m_c_Radiotherapy m_c_Radiotherapy MAKE f_m_c_anti_glaucoma_medications m_c_anti_glaucoma_medications ASSOONAS please_save

SCRATCHPAD PUT (165, f_m_c_eye_lubricants) SCRATCHPAD PUT (166, f_m_c_systemic_steroids) SCRATCHPAD PUT (167, f_m_c_raise_head_w_dioretics) SCRATCHPAD PUT (168, f_m_c_raise_head_w_no_dioretics) SCRATCHPAD PUT (169, f_m_c_occlusion_or_prism) SCRATCHPAD PUT (170, f_m_c_Radiotherapy) SCRATCHPAD PUT (171, f_m_c_anti_glaucoma_medications) ASSOONAS please_sheel

{---------- SURGICAL TREATMENT ----------} { 180 - 190 }

MAKE f_m_c_tarsoraphy m_c_tarsoraphy MAKE f_m_c_lid_lenghthen m_c_lid_lenghthen MAKE f_m_c_decompression m_c_decompression MAKE f_m_c_muscles_surgery m_c_muscles_surgery ASSOONAS please_save

SCRATCHPAD PUT (180, f_m_c_tarsoraphy) SCRATCHPAD PUT (181, f_m_c_lid_lenghthen) SCRATCHPAD PUT (182, f_m_c_decompression) SCRATCHPAD PUT (183, f_m_c_muscles_surgery) ASSOONAS please_sheel

{----------}
{**********} { THIS IS A NEW VERSION OF ADD99.XPT AFTER JL20 1988 } { THE OLD ONE IS KEPT UNDER ADD99.OLD} {**********}

DISPLAY '#13,27#[0;31;46m#13,27#[0;34;46m #13# #35,35,35,35,35,35,35,35# #35,35,35,35,35,35,35,35# #35,35,35,35,35# #35,35,35,35,35,35,35,35# #35,35# #35,35# #13# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35,13# #35,35# #35,35,35,35,35,35# #35,35# #35,35# #35,35,35,35,35,35# #35,35,35,13# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35# #35,35,13# #35,35# #35,35,35,35,35,35,35,35# #35,35,35,35,35# #35,35,35,35,35,35,35,35# #35,35# #35,35,13# #13,27#[30m #13# Welcome to TEDEX #13# ---------- #13# #13# TEDEX is an expert system which advises #13# on management of patients with dysthyroid #13# eye disease. '

ASSOONAS AT_START

GROUP g_history g_patient_personal g_patient_complaint_history

{----------}{---------- introduce tedex to novice user ----------}

QUESTION a_c_tedex_user ' #13# #13,13,13,13,13# Have you used TEDEX before ? ' YESNO

QUESTION a_i_novice_user_intro ' #13# There is a wide range of supporting #13# information that can be given. #13# #13# 1 - The aim and purpose of the system. #13# 2 - How to make best use of it. #13# 3 - The limitations. #13# 4 - The assumptions made. #13# 5 - Glossary of terms

```
used #13#  6 - Expert systems and how they work.#13# #13#  0 - No more,thank you. #13# #13# (
pressing h key will bring you back here ) ' INTEGER 0 6

DISPLAY ' #13#  TEDEX will ask you questions about your #13#  patient in order to come to a
conclusion. #13# #13#  TEDEX is knowledgeable about dysthyroid #13#  eye disease, its
reasoning is mainly #13#  based on a long term follow up study of #13#  224 patients treated in the
Tennent Institute #13#  of Ophthalmology, Glasgow, UK. #13#  Also a critical review of the
literature #13#  in this area completed the qualifications to #13#  build such a system. #13# #13#
TEDEX is crurrently under testing and #13#  evaluation in real life clinical set up. #13# #13# #13#
Please do not take its conclusions in preference #13#  to advice from experienced specialist.'
INVESTIGATE a_i_novice_user_intro ASSOONAS NOT a_c_tedex_user

DISPLAY' #13#  1 - My aim and purpose. ' CLEAR a_i_novice_user_intro ASSOONAS
a_i_novice_user_intro = 1

DISPLAY' #13#  2 - How to make best use of me.  ' CLEAR a_i_novice_user_intro ASSOONAS
a_i_novice_user_intro = 2

DISPLAY' #13#  3 - My limitatioms.  ' CLEAR a_i_novice_user_intro ASSOONAS
a_i_novice_user_intro = 3

DISPLAY' #13#  4 - The assumptions I make.  ' CLEAR a_i_novice_user_intro ASSOONAS
a_i_novice_user_intro = 4

DISPLAY' #13#  5 - Glossary of terms I use.  ' CLEAR a_i_novice_user_intro ASSOONAS
a_i_novice_user_intro = 5

DISPLAY' #13#  6 - Expert systems and how they work.' CLEAR a_i_novice_user_intro
ASSOONAS a_i_novice_user_intro = 6

DISPLAY ' #13# Now we start work ' ASSOONAS a_i_novice_user_intro = 0

{************************************************************************}
{---------- USER PERSONAL INFORMATION ----------}

GROUP g_user_personal  a_s_who_are_you a_i_user_experience

QUESTION a_s_who_are_you '#13,13,13,13#  First..#13# #13#  Please type in
#27#[0;30;47myour name ? ' ALPHA

QUESTION a_i_user_experience ' #13# #13#  Are you .. #13# #13#  (1) Consultant Ophthalmologist.
#13#  (2) Senior Registrar in Ophthalmology. #13#  (3) Registrar in Ophthalmology. #13#  (4)
Senior House Officer/House officer. #13#  (5) Endocrinologist. #13#  (6) GP. #13# #13#  (7)
Student. #13#  (8) Patient. ' INTEGER 1 7

STRING s_Dr ' ' ' ' IF (a_i_user_experience = 7) ELSE 'Dr.'

DISPLAY '#13,13,13,13# #13#  Now #s_Dr# #a_s_who_are_you# #13# #13#  Please type in the
personal information and the #13#  medical history of your patient. ' ASSOONAS ANSWERED
a_i_user_experience AND NOT (a_i_user_experience = 7)
```

```
DISPLAY ' #13# #13# #13,13,27#[5;31m                I am very sorry #13,27#[0;30;46m#13# #13,13#
#13#        THIS PROGRAM IS NOT FOR PATIENTS ' MAKE AT_END TRUE ASSOONAS
ANSWERED a_i_user_experience AND (a_i_user_experience = 7)

{**********************************************************************} {----------
PATIENT  PERSONAL  INFORMATION ----------}

GROUP g_patient_personal   a_s_patient_name a_i_patient_DOB  i_patient_age
a_s_patient_sex

QUESTION a_s_patient_name '#13,13,13,13,13,13#        Enter patient''s name ?' SCRATCHPAD  10
ALPHA

QUESTION a_i_patient_DOB '#13,13,13# #13# #13#      Enter patient''s year of birth ? #13#
(19__) #13# #13# ' SCRATCHPAD 11 NUMERIC 0 99

NUMBER i_patient_age' ' 89 - a_i_patient_DOB

{ QUESTION  a_i_patient_age '#13,13,13,13,13,13#          Enter patient''s age ?#13,13# (in
years)#13,13#' SCRATCHPAD 12 INTEGER 1  90 }

QUESTION a_s_patient_sex '#13,13,13,13# #13,13#        What is the patient''s sex ? (M/F) #13,13# '
SCRATCHPAD 13 ALPHA 1 1

{**********************************************************************}
{---------- PATIENT COMPLAIN & HISTORY ----------}

GROUP g_patient_complaint_history        g_patient_complaint  a_i_patient_most_troublesome
a_i_eye_disease_duration a_i_thyroid_status        a_i_thyroid_disease_duration
g_previous_sys_conditions g_previous_thyroid_treatment        g_previous_eye_treatment
a_i_patient_appearance

GROUP g_patient_complaint      a_c_lacrimination?       a_c_photophobia?
a_c_visual_blurring?      a_c_double_vision?                  a_c_pain?
{.....}

QUESTION  a_c_lacrimination?  '#13,27#[0m#13,27#[30;47m    Patient complaint#27#[30m:#13,13#
#27#[5m #27#[0;30;47m1 #27#[30m-#27#[30m
#27#[0;5;31;47mL#27#[5;31;47ma#27#[31mc#27#[31mrimation#27#[0;30;47m.#13#
#27#[1;30m2#27#[30m - Photophobia.#13#    3 - Blurring of vision.#13#    4 - Double vision.#13#    5 -
Pain.#13,13,13,27#[0;30;47m    Does the patient suffer from#13,13,27#[1;31m   #27#[5;31m
#27#[0;31;47mLacrimation #27#[0;5;30;47m? #27#[5m(Y/N)#27#[0;5m#13,13,27#[47m #27#[30m
#27#[30;47m ' YESNO

{.....}

QUESTION  a_c_photophobia?  '#13,13#    Patient complaint:#13,13,27#[1m    1 -#27#[1m
#27#[0;1;30;47mL#27#[1macrimati#27#[1mon.#27#[0;30;47m #27#[0;47m #13,27#[30m
#27#[0;30;47m2 - #27#[31mPhotophobia.#27#[0;30;47m #13,27#[0;30;47m    #27#[1m3 - Blurring of
vision.#13#    4 - Double vision.#13# 5 - Pain.#13,13,13#    #27#[0;30;47m Does the patient suffer
from#13,13,27#[0;35;47m #27#[0;5;31;47mPhotophobia #27#[0;5;30;47m?
#27#[5m(Y/N)#27#[0;5m#13,27#[47m#13,27#[47m #27#[30m #27#[30;47m '
```

YESNO

{.....}

QUESTION a_c_visual_blurring? ' #13,27#[30;47m#13# Patient complaint:#13,13,27#[1m 1#27#[0;30;47m #27#[1;47m- Lacrimation.#27#[0;47m#13,27#[30m #27#[1m #27#[30m2#27#[30m - Ph#27#[30motophobia.#13,27#[0;47m #27#[30m3 - #27#[31mBlurring of vision.#27#[0;30;47m#13,27#[1m #27#[30;47m 4 - Double vision.#13,27#[1m 5 - Pain.#13,27#[30m#13,27#[30m#13,27#[0;30;47m Does the patient suffer form #13,13# #27#[0;31;47mBlurring of vision #27#[0;5;30;47m? #27#[5m(Y/N)#27#[0;5;47m #27#[34m #13,27#[47m #27#[30m #27#[30;47m #13#' YESNO

{.....}

QUESTION a_c_double_vision? '#13# #13,27#[30;47m Patient complaint: #13,13# #27#[1m 1#27#[0;30;47m #27#[1;47m- Lacrimation#27#[0;30;47m.#27#[0;47m #13# #27#[1;30m2#27#[30m - Ph#27#[30motophobia.#13# 3 -#27#[0;1;5;31;47m #27#[0;1;30;47mB#27#[1mlurring of vision.#13,27#[30;47m #27#[0;30;47m4 - #27#[0;5;31;47mDouble vision#27#[0;30;47m.#13# #27#[1m5 - Pain.#13,13# #13# #27#[0;30;47mDoes the patient suffer from#13,13# #27#[0;31;47mDouble vision #27#[5;30;47m?#27#[5m (Y/N)#27#[0;5;47m #27#[34m #13,27#[47m #27#[30m #27#[30;47m #13#' YESNO

Question a_c_pain?' #13,27#[30;47m#13# Patient complaint: #13# #13,27#[1m 1#27#[0;30;47m #27#[1;47m- Lacrimation.#27#[0;47m #13,27#[1m #27#[30m2#27#[30m - #27#[30mPhotophobia.#13# 3 - Blurring of vision.#27#[0;30;47m#13,27#[1;30;47m 4 - Double vision.#13# #27#[0;30;47m 5 - #27#[31mPain.#13,13,13# #27#[30mDoes the patient suffer from#13,13# #27#[31mPain #27#[5;30;47m? #27#[5m(Y/N)#27#[0;5m#13,27#[47m #27#[34m #13,27#[47m #27#[30m #27#[30;47m #13#' YESNO

QUESTION a_i_patient_most_troublesome '#13# #13# Which symptom is the most troublesome#13,13# to the patient ?

#13,13# #13# (1) Cosmetic appearance.#13,13# (2) Blurring of vision.

#13# (3) Double vision.#13# #13# (4) Pain / lacrimation / photophobia. ' INTEGER 1 4

{ -------- diplopia }

QUESTION a_i_eye_disease_duration ' #13,13,13,13,13# How long is it since the patient''s#13,13# first eye symptom ? #13# (in months) ' SCRATCHPAD 70 INTEGER 1 120

QUESTION a_i_thyroid_status '#13# #13,13# What is the status of the thyroid ?#13,13# #13# (1) Hyperthyroid. #13# #13# (2) Hypothyroid. #13# #13# (3) Euthyroid. ' INTEGER 1 3

QUESTION a_i_thyroid_disease_duration'#13# #13,13,13# #13# How long is it since the first #13,13# thyroid disease symptoms ? #13,13# (in month) ' SCRATCHPAD 40 [SHOULD BE 41] INTEGER 1 300

{----------} GROUPg_previous_sys_conditions a_c_Diabetic? a_c_Hypertensive? a_c_Renal? a_c_Pulmonaric? a_c_GI?

QUESTION a_c_Diabetic?'#13# #13,13,13# Systemic conditions #13# #13# #27#[1m #27#[0;30;47m1 - #27#[31mDiabetes.#27#[5;34m #13# #27#[0;1;30;47m2#27#[30m - Hypertension.

#13# 3 - Renal disease. #13# 4 - Pulmonary disease. #13# 5 - GI disease. #13,13,13,27#[1m #27#[0;30;47mIs the patient#27#[31m #27#[0;31;47mDiabet#27#[31mic#27#[34m #27#[30m?#27#[5;30m (Y/N)#27#[0;30;47m' YESNO ONLY

QUESTION a_c_Hypertensive?' #13,13,13,13# Systemic conditions #13# #13,27#[1m 1 - Diabetes. #13# #27#[0;30;47m 2 - #27#[31mHypertension.#27#[5;34m

#13# #27#[1m #27#[0;1;30;47m3#27#[1;30;47m - Renal disease. #13# 4 - Pulmonary disease. #13# 5 - GI disease. #13,13,13,27#[1m #27#[0;30;47mIs the patient #27#[0;31;47mH#27#[31mypertensive #27#[30m?#27#[5;30m (Y/N)' YESNO ONLY

QUESTION a_c_Renal?'#27#[30m #13,13,13,13# Systemic conditions #13# #13# #27#[1m1 - Diabetes. #13# 2 - Hypertension. #13# #27#[0;30;47m3 - #27#[31mRenal disease.#27#[5;34m #13# #27#[1;30m #27#[0;1;30;47m4#27#[1;30m - Pulmonary disease. #13# 5 - GI disease. #13,13,13,27#[1m #27#[0;30;47mDoes the patient suffer from any #13# #27#[0;31;47mr#27#[31menal disease #27#[30m? #27#[5;30m(Y/N)' YESNO ONLY

QUESTION a_c_Pulmonaric?'#27#[30;47m #27#[0m#13,13,27#[30;47m#13,13# Systemic conditions #13,27#[1m#13,27#[1;5m #27#[0;1;30;47m1#27#[1m - Diabete#27#[47ms.

#13# 2 - Hypertension. #13# 3 - Renal disease.#13,27#[30m #27#[0;30;47m4#27#[30m - #27#[31mPulmonary disease.#27#[0;30;47m #13,27#[30m #27#[0;1;30;47m5 - GI disease.#13,13,13,27#[1;30;47m #27#[47m #27#[47m #27#[0;30;47mDoes the patient suffer from any #13# #27#[0;34;47m #27#[31mpulmonary diseases #27#[30m?#27#[5;30m (Y/N)' YESNO ONLY

QUESTION a_c_GI?'#13,13,13,13# Systemic conditions #13# #13# #27#[1m 1 - Diabetes. #13# 2 - Hypertension. #13# 3 - Renal disease. #13# 4 - Pulmonary disease. #13# #27#[0;30;47m 5 - #27#[31mGI disease.#27#[0m#13,13,13,27#[30;47m #27#[1mDoes the patient suffer from any #13# #27#[0;31;47mg#27#[31mastero-intestinal disease#27#[30m ?#27#[5;30m (Y/N)' YESNO ONLY

{----------} GROUP g_previous_thyroid_treatment a_c_Radioactive_iodine? a_c_Thyroidectomy? a_c_Carbimazol? g_thyroid_biochemistry

QUESTION a_c_Radioactive_iodine?

'#27#[0;30;47m#13# #13,13# Previous thyroid treatment: #13# #13# #27#[33m #27#[36m #27#[30m1 - #27#[31mRadioactive iodine.#27#[0;30;47m #13# #27#[1m2 - Thyroidectomy. #13# 3 - Carbimazole. #13# #13# #27#[0;30;47m Has the patient been treated by#13# #27#[0;31;47mR#27#[31madioactive Iodine #27#[30m?#27#[5;30m (Y/N)#27#[0;30;47m' YESNO

{.....}

QUESTION a_c_Thyroidectomy? '#13# #13# #13# Previous thyroid treatment: #13# #13# #27#[30m #27#[0;30;47m1#27#[47m #27#[1;30;47m- Radioactive iodine.#13# 2 - #27#[31mT#27#[31mhyroidectomy.#27#[0;30;47m #13# 3 - Carbimazole. #13# #13# #27#[0;30;47mHas the patient been treated by #27#[0;35;47m#13# #27#[31mThyroidectomy #27#[5;30m? (Y/N)#27#[0;30;47m ' YESNO {.....}

QUESTION a_c_Carbimazol? '#27#[47m#13# #13# #13# Previous thyroid treatment: #13# #13# #27#[1m 1 - Radioactive iodine. #13# 2 - Thyroidectomy. #13# #27#[0;30;47m 3 - #27#[31mCarbimazole.#27#[0;30;47m#13# #13,27#[1m #27#[0;30;47m Has the patient been treated by #13# #27#[0;35;47m #27#[31mCarbimazole #27#[5;30m? (Y/N)#27#[0;30;47m#13#' YESNO

{----------} GROUP g_thyroid_biochemistry a_i_T3 a_i_T4 a_i_TSH

QUESTION a_i_T3 ' #13# #13,13# #13# #13# Enter the T3 (Tri-iodo-thyronine)#13# #13# blood level?' INTEGER 1 50

QUESTION a_i_T4 '#13,13,13,13,13# Enter The T4 (Thyroxin)#13# #13# blood level ? ' INTEGER 1 50

QUESTION a_i_TSH '#13# #13,13,13,13# Enter the TSH (Thyroid Stimulation Hormone)#13# #13# assay result ? ' INTEGER 1 50

{----------} GROUP g_previous_eye_treatment a_c_Eye_lubricants? a_i_Eye_lub_effect? a_c_Tr_for_corneal_ulcer? a_i_Tr_c_ulcer_effect? a_c_Lid_lengthening? a_i_Lid_length_effect? a_c_Tarsorhaphy? a_i_Tarsorhaphy_effect? a_c_Systemic_steroids? a_i_Sys_steroids_effect? a_c_Radiotherapy? a_i_Radiotherapy_effect? a_c_decompression? a_i_decompression_effect? a_c_Prisms_occlusion? a_i_Prisms_occl_effect? a_c_Muscle_surgery? a_i_Muscle_surg_effect?

{.....}

QUESTION a_c_Eye_lubricants? ' Previous eye treatment: #13# #13# 1 - #27#[5;31mE#27#[31mye lubricants.#27#[0;30;47m #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure. #13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - Decompression. #13# 8 - Prisms / occlusion. #13# 9 - Muscle surgery. #13# #13# Did the patient use #27#[31mE#27#[31mye lubricants #27#[0;30;47m(#27#[5mY/N#27#[0;30;47m)#27#[30;47m ?#27#[0;5m#13,27#[0;1;32;47m '

SCRATCHPAD 71 YESNO

{.....} QUESTION a_i_Eye_lub_effect? '#27#[1m Previous eye treatment: #13,13# 1 - #27#[0;1;5;31;47mE#27#[31mye lubricants#27#[5m.#27#[0;30;47m #13# #27#[1m2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - Decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mEye lubricant #27#[30mtreatment?#13,27#[0;30;47m#13# 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Eye_lubricants? ELSE 0

{.....}

QUESTION a_c_Tr_for_corneal_ulcer? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 #27#[0;30;47m-#27#[30;47m #27#[5;31mT#27#[31mreatment for corneal ulcer.#27#[0;30;47m #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Did the patient recieve treatment for#13# #27#[31mc#27#[31morneal ulcer #27#[0;30;47m(#27#[5mY/N#27#[0;30;47m)#27#[30;47m ?#27#[0;5m'

SCRATCHPAD 72 YESNO

{.....}QUESTIONa_i_Tr_c_ulcer_effect? '#27#[1m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2#27#[1m #27#[0;1;30;47m-#27#[30;47m #27#[1;5;31mT#27#[31mreatment for corneal ulcer.#27#[0;30;47m #13,27#[1m 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mCorneal ulcer #27#[30mtreatment?#27#[0;5m#13,27#[30;47m #27#[0m#13,27#[30;47m 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Tr_for_corneal_ulcer? ELSE 0

{.....}

QUESTION a_c_Lid_lengthening? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - #27#[5;31mL#27#[31mid lengthening procedure.#27#[0;30;47m#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Does the patient have previous #27#[31mL#27#[31mid #27#[31mlengthening#13# procedure #27#[0;30;47m(#27#[5mY/N#27#[0;30;47m)#27#[30;47m ? #27#[0;5m'

SCRATCHPAD 73 YESNO

{.....}QUESTIONa_i_Lid_length_effect? '#27#[1m Previous eye treatment: #13,13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - #27#[5;31mL#27#[31mid lengthening procedure.#27#[0;30;47m#13,27#[1m 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of the #27#[31mLid #27#[0;30;47mprocedure ?#13,13# 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Lid_lengthening? ELSE 0

{.....}

QUESTION a_c_Tarsorhaphy? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - #27#[5;31mT#27#[31marsorrhaphy.#27#[0;30;47m#13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Did the patient have previous #27#[31mT#27#[31marsorrhaphy#27#[0;30;47m(#27#[5mY/N#27#[0;30;47m)#27#[30;47m?#27#[30;47m #27#[0;5;47m #27#[47m #13# '

SCRATCHPAD 74 YESNO

{.....}QUESTIONa_i_Tarsorhaphy_effect? '#27#[1m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - #27#[5;31mT#27#[31marsorrhaphy.#27#[0;30;47m#13,27#[1m 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mT#27#[31marsorrhaphy #27#[0;5m#13,27#[0;30;47m #27#[0m#13,27#[0;30;47m 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Tarsorhaphy? ELSE 0

{.....}

QUESTION a_c_Systemic_steroids? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - #27#[5;31mS#27#[31mystemic steroid.#27#[0;30;47m#13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Did the patient receive #27#[31mS#27#[31mystemic steroids #13# #27#[0;30;47m(#27#[5;30mY#27#[30m/#27#[30mN#27#[0;30;47m)?#27#[0;5;30;47m

'SCRATCHPAD 75 YESNO

{.....} QUESTIONa_i_Sys_steroids_effect? '#27#[1m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - #27#[5;31mS#27#[31mystemic steroid.#27#[0;30;47m#13,27#[1m 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mSystemic steroid #27#[30mcourse?#13# #27#[0;5m#13,27#[0;30;47m 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Systemic_steroids? ELSE 0

{.....}

QUESTION a_c_Radiotherapy? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - #27#[5;31mR#27#[31madiotherapy of the orbit.#27#[0;30;47m#13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Did the patient have orbital #27#[31mR#27#[31madiotherapy#27#[0;30;47m (#27#[5mY/N#27#[0;30;47m)#27#[30;47m?#27#[0;5m'

SCRATCHPAD 76 YESNO

{.....} QUESTIONa_i_Radiotherapy_effect? '#27#[1;30m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - #27#[5;31mR#27#[31madiotherapy of the orbit.#27#[0;30;47m#13,27#[0;1;30;47m 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mR#27#[31madiotherapy #27#[0;5m#13,27#[0;30;47m

#13# 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Radiotherapy? ELSE 0

{.....}

QUESTION a_c_decompression? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - #27#[5;31md#27#[31mecompression.#27#[0;30;47m #13,27#[30;47m 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13# Did the patient undergone #27#[31mOrbital#13# #27#[31mDecompression #27#[0;30;47m(#27#[5mY/N#27#[0;30;47m) ? #27#[0;5m'

SCRATCHPAD 77 YESNO

{.....} QUESTIONa_i_decompression_effect?
'#27#[1m Previous eye treatment: #13,13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - #27#[5;31md#27#[31mecompression.#27#[0;30;47m #13,27#[1;30;47m 8 - Prisms / occlusion.#13# 9 - Muscle surgery. #13,13,27#[0;30;47m What was the result of #27#[31mD#27#[31mecompression #27#[0;5m#13,13,27#[0;30;47m 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_decompression? ELSE 0

{.....}

QUESTION a_c_Prisms_occlusion? '#27#[30m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - #27#[5;31mP#27#[31mrisms / occlusion.#27#[0;30;47m#13,27#[30;47m 9 - Muscle surgery. #13,13# Did the patient have previously used #13# #27#[31mp#27#[31mrisms / occlusion #27#[0;30;47m(#27#[5mY/N#27#[0;30;47m) ? #27#[0;5m'

SCRATCHPAD 78 YESNO

{.....} QUESTIONa_i_Prisms_occl_effect? '#27#[1m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - #27#[5;31mP#27#[31mrisms / occlusion.#27#[0;30;47m#13,27#[30;47m #27#[1m9 - Muscle surgery. #13,13,27#[0;30;47m What isthe result of #27#[31mprisms/occlusion #27#[30mtreatment? #27#[0;5m#13,27#[30;47m 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Prisms_occlusion? ELSE 0

{.....}

QUESTION a_c_Muscle_surgery? ' Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - #27#[5;31mM#27#[31muscle surgery.#27#[0;30;47m#13,13,27#[30;47m Did the patient have extra ocular #27#[31mMuscle #13# #27#[31msurgery #27#[0;30;47m(#27#[5mY/N #27#[0;30;47m)?#27#[0;5m#13,27#[30;47m'

SCRATCHPAD 79 YESNO

{.....} QUESTIONa_i_Muscle_surg_effect? '#27#[1m Previous eye treatment: #13# #13# 1 - Eye lubricants. #13# 2 - Treatment for corneal ulcer. #13# 3 - Lid lengthening procedure.#13# 4 - Tarsorrhaphy. #13# 5 - Systemic steroids. #13# 6 - Radiotherapy of the orbit. #13# 7 - decompression. #13# 8 - Prisms / occlusion.#13# 9 - #27#[5;31mM#27#[31muscle surgery.#27#[0;30;47m#13,13# What was the result of #27#[31mMuscle surgery #27#[30m? #27#[0;5m#13,27#[0;30;47m

#13# 1 - Sucess (improvement).#13# 2 - Failure (or minimal effect).#13# 3 - Side effects.'

INTEGER 1 3 IF a_c_Muscle_surgery? ELSE 0

```
{----------------------------------------------------------------------}

QUESTION a_i_patient_appearance ' #13# #13# #13#    In your view, how bad is the effect of #13#
the eye condition on the patient''s #13#    appearance ? #13# #13#          ( On a scale from 1 to 10 )
#13#              1 ....  normal #13#              10 .... abnormal #13# ' NUMERIC 1 10

{*************************************************************************}
{--------------------- START CLINICAL TEST ----------------------------} QUESTION a_i_main_menu
'#27#[30;47m #13,13# #13#        O P E N I N G   M E N U#13#          ----------------------#13#
#13,13#       (1) New patient. #13,13#       (2) Follow up visit. #13,13#       (3) Print last session
report. #13,13#       (4) Teaching session. #13# '

INTEGER 1 4
{*************************************************************************}
QUESTION a_i_teaching_menu '#13,13# #13#              Teaching Menu #13# #13# #13#        1 -
----------. #13#        2 - Treatment directly. #13#        3 - ----------. #13#        4 -
----------. #13# '

INTEGER 1 4

INVESTIGATE a_i_teaching_menu ASSOONAS (a_i_main_menu = 4)

{*************************************************************************}

QUESTION a_s_hospital_number?'#13,13,13,13,13# #13#      Enter the patient''s#13# #13#
Hospital Number ?' ALPHA 9 9

{*************************************************************************}
QUESTION a_c_Hart_disease '#13,13,13,13#    Is the patient suffering from any#13,13#      heart
disease ? ' YESNO
```

{**********}
[DIAG.XPT HAS BEEN MODIFYED HERE AT 21 JULY 1988 THE OLD ONE HAS BEEN KEPT UNDER DIAG.OLD]
{**********}

{&&&

{ the 100_hue_test should be conditioned by :- the patient should not be color blind , these 3 p_variables are converted/originated from numerical questions }

{%%%

{!!!

```
PROBABILITY p_temprac_change 'OOOOOOOOOOOOOOO' MEMBER( a_i_temprac_change ,
0.1 , 0.9 , 5.1 , 98 , 99 ) IF NOT (a_i_main_menu = 1)

QUESTION a_i_temprac_change '#13# Enter the patient temprac''s acuity drop                    #13#
change compared to last visit acuity drop ?                  #13#                  #13# 1 line
#13# 2 lines                  #13# 3                  #13# l                  #13# l
#13# 5                  ' INTEGER 1 5      }

{::::::
```

p_100_hue_now LS 6 LN 1 P_100_hue_change LS 9 LN 1

IF (ANSWERED a_c_100_HUE? AND a_c_100_HUE?) ELSE OPPOSITE (p_vision_dummy)

{!!!

QUESTION a_p_charts_comment ' #13# How you interpret nerve condition #13# from reading charts ?

#13# #13# 1 - Normal field. #13# 2 - Probably normal. #13# 3 - Probably nerve compression. #13# 4 - Typical nerve compression. ' INTEGER 1 4 }

{||||||

{%%%

p_diplopia_on_examination_now LS 10 LN 1 p_diplopia_on_examination_change LS 30 LN 1

PRIOR 0.1

{!!!

PRIOR 0.1 {||||||

QUESTION a_i_Hess_chart_now ' #13# #13# Enter #13# Hess chart/orthoptic report conclusion : #13# ---------- #13# 1 - Normal motility. #13# 2 - Restricted up gaze. #13# 3 - Restricted down'gaze. #13# 4 - Restricted up and down gaze. #13# 5 - Restricted abduction. #13# 6 - Restricted adduction. #13# 7 - Restricted abduction and adduction. #13# 8 - Combination of restrictions. #13# 9 - Fixed eye. ' INTEGER 1 9

{!!!

QUESTION a_i_MRIscan' #13# #13# Enter your comment on Right Orbital #13# #13# MRIscan #13# #13# #13# 1 - E.O.M. normal. #13# #13# 2 - The muscles are moderately thickened. #13# 3 - Markedly swollen. #13# #13# 4 - Swollen and crowded at orbital apex. '

INTEGER 0 4

{||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||}

{&&&

PROBABILITY p_lid_retraction 'to see the effect of lid retraction on eye coverage '
MEMBER(a_i_lid_retraction , 0.1 , 0.9 , 4.1 , 98 , 99)

QUESTION a_i_lid_retraction ' #13# #13# #13# Right Eye Lid: #13# #13# #13# (1) Normal. #13# #13# (2) Mild retraction. #13# (3) Moderate retraction. #13# #13# (4) Severe retraction. ' INTEGER 1 4

{||||||

{IIII

{!!!

{IIII

#13# Goldmann applanation tonometer can be used to

#13# measure the intraocular pressure in straight, up

#13# and down directions of gaze while still

#13# applanating the central area of the cornea. '

INTEGER 10 50

QUESTION a_i_IOP_straight ' #13# #13# #13# #13# enter Interocular straight pressure ' INTEGER
10 50

{&&&

```
{**************************************************************************}
{TREATMENT MODULE 89_TR.XPT }
{**************************************************************************}

CONDITION z_begin' ' MADE

MAKE z_begin TRUE ASSOONAS (a_i_teaching_menu=2)

STRING s_already_said ' ' MADE STRING s_lid_already_said ' ' MADE

{&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&&&&&&&&&&&&&&&&&&}
{&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&&&&&&&&&&&&&&&&&&}

NUMBER cccc ' ' ccc_? IF z_begin ELSE cccc_converted

NUMBER cccc_converted ' ' 4 IF validate_finished AND (p_mal_cornea > 0.7) ELSE cccc_converted_a

NUMBER cccc_converted_a ' ' 3 IF validate_finished AND ((p_mal_cornea > 0.5) AND (p_mal_cornea
< 0.699)) ELSE cccc_converted_b

NUMBER cccc_converted_b ' ' 2 IF validate_finished AND ((p_mal_cornea > 0.3) AND (p_mal_cornea
< 0.499)) ELSE cccc_converted_c

NUMBER cccc_converted_c ' ' 1 IF validate_finished AND ((p_mal_cornea < 0.299))

{.....} NUMBER nnnn ' ' nnn_? IF z_begin ELSE
nnnn_converted

NUMBER nnnn_converted ' ' 4 IF validate_finished AND (p_mal_nerve > 0.7) ELSE nnnn_converted_a

NUMBER nnnn_converted_a ' ' 3 IF validate_finished AND ((p_mal_nerve > 0.5) AND (p_mal_nerve
< 0.699)) ELSE nnnn_converted_b

NUMBER nnnn_converted_b ' ' 2 IF validate_finished AND ((p_mal_nerve > 0.3) AND (p_mal_nerve
< 0.499)) ELSE nnnn_converted_c

NUMBER nnnn_converted_c ' ' 1 IF validate_finished AND ((p_mal_nerve < 0.299))

{.....}

NUMBER llll ' ' lll_? IF z_begin ELSE llll_converted

NUMBER llll_converted ' ' 4 IF validate_finished AND (p_mal_lid > 0.7) ELSE llll_converted_a

NUMBER llll_converted_a ' ' 3 IF validate_finished AND ((p_mal_lid > 0.5) AND (p_mal_lid <
0.699)) ELSE llll_converted_b

NUMBER llll_converted_b ' ' 2 IF validate_finished AND ((p_mal_lid > 0.3) AND (p_mal_lid <
0.499)) ELSE llll_converted_c
```

NUMBER llll_converted_c ' ' 1 IF validate_finished AND ((p_mal_lid < 0.299))

{.....}

NUMBER mmmm ' ' mmm_? IF z_begin ELSE mmmm_converted

NUMBER mmmm_converted ' ' 4 IF validate_finished AND (p_mal_muscles > 0.7) ELSE mmmm_converted_a

NUMBER mmmm_converted_a ' ' 3 IF validate_finished AND ((p_mal_muscles > 0.5) AND (p_mal_muscles < 0.699)) ELSE mmmm_converted_b

NUMBER mmmm_converted_b ' ' 2 IF validate_finished AND ((p_mal_muscles > 0.3) AND (p_mal_muscles < 0.499)) ELSE mmmm_converted_c

NUMBER mmmm_converted_c ' ' 1 IF validate_finished AND ((p_mal_muscles < 0.299))
{.....} NUMBER prop ' ' pro_? IF z_begin ELSE prop_converted

NUMBER prop_converted ' ' 3 IF validate_finished AND (p_proptosis > 0.7) ELSE prop_converted_a

NUMBER prop_converted_a ' ' 2 IF validate_finished AND ((p_proptosis > 0.3) AND (p_proptosis < 0.699)) ELSE prop_converted_b

NUMBER prop_converted_b ' ' 1 IF validate_finished AND (p_proptosis < 0.299)

{&&&

```
NUMBER i_choose_action_2 ' ' 2 IF (nnnn=4) ELSE i_choose_action_3

NUMBER i_choose_action_3 ' ' 3 IF (nnnn=3) ELSE i_choose_action_4

NUMBER i_choose_action_4 ' ' 4 IF (mmmm=4) OR (nnnn=2) OR (cccc=3) OR (llll=3) OR (llll=4)
ELSE i_choose_action_5

NUMBER i_choose_action_5 ' ' 5 IF (mmmm=3) OR (cccc=2) OR (llll=2) ELSE i_choose_action_6

NUMBER i_choose_action_6 ' ' 6 IF (mmmm=2) ELSE i_choose_action_7

NUMBER i_choose_action_7 ' ' 7 IF (mmmm=1) ELSE i_choose_action_8

NUMBER i_choose_action_8 ' ' 8 IF (cccc=1) OR (nnnn=1) OR (llll=1)

INVESTIGATE i_choose_action_1 ASSOONAS c_announce_action

{.....}

REPORT (70)' #13# #13# ACTION (70) 1 #13# _____ #13# #13# Urgent admission. '
ASSOONAS (i_choose_action_1 =1) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 2 #13# _____ #13# #13# Admission. ' ASSOONAS
(i_choose_action_1 =2) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 3 #13# _____ #13# #13# Two weeks. ' ASSOONAS
(i_choose_action_1 =3) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 4 #13# _____ #13# #13# One month. ' ASSOONAS
(i_choose_action_1 =4) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 5 #13# _____ #13# #13# Three month. '
ASSOONAS (i_choose_action_1 =5) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 6 #13# _____ #13# #13# Six month. ' ASSOONAS
(i_choose_action_1 =6) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 7 #13# _____ #13# #13# Eight months to one year. '
ASSOONAS (i_choose_action_1 =7) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

REPORT (70)' #13# #13# ACTION (70) 8 #13# _____ #13# #13# No further appointment. '
ASSOONAS (i_choose_action_1 =8) AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

{$$$
```

DISPLAY ' no_ulcer ' ASSOONAS c_no_ulcer

CONDITION c_no_ulcer ' ' TRUE IF ((cccc 3) AND c_start_treatment) ELSE FALSE

{.....} { QUESTION anti_steroids ' anti_steroid ' YESNO

QUESTION anti_surgery 'anti_surgery ' YESNO

QUESTION anti_radio ' anti_radio ' YESNO

INVESTIGATE anti_steroids ASSOONAS (a_i_treat_nerve = 1) OR ((cccc=4) AND (nnnn=4))

INVESTIGATE anti_surgery ASSOONAS (a_i_treat_nerve = 2) OR (a_i_lid_tars_leng_deco = 3) OR (c_muscles_troubles AND (NOT c_any_other_troubles) AND (ANSWERED c_stable AND c_stable) [AND ((prop=2)OR(prop=3))])

INVESTIGATE anti_radio ASSOONAS (a_i_treat_nerve = 3) OR ((cccc=4) AND (nnnn=4) AND anti_steroids) }

{UUUU

CONDITION c_tr_ulc_nerv_w_radiotherapy ' ' c_start_treatment AND ((NOT anti_radio) AND anti_steroids AND ((nnnn=4) AND (cccc=4)))

REPORT(16) ' #13# #13# It is recomended to postpone #13# orbital decompression untill the #13# corneal ulcer heals while radio- #13# therapy is out of question now. #13# #13# Although there are definite #13# contrandications in this #13# particular patient to the use of #13# systemic steroids, this is the #13# only choice available. #13# #13# It recommended to start a #13# systemic steroid course under #13# strict medical supervision. ' ASSOONAS c_tr_ulc_nerv_critical AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_ulc_nerv_critical ' ' c_start_treatment AND anti_radio AND anti_steroids AND ((nnnn=4) AND (cccc=4)) {.....} {QQQQQQQQQQQQ QQQQQQQQQQ QQQQQQQQQQQ QQQQQQQQQQQQQQQQQ QQQQQQ}

STRING s_proptosis ' ' 'also proptosis is severe' IF (prop=3) ELSE s1_proptosis

STRING s1_proptosis ' ' 'also proptosis is moderate' IF (prop=2) ELSE s2_proptosis

STRING s2_proptosis ' ' 'also proptosis is mild' IF (prop=1)

{.....} STRING s_anti_steroids ' ' ' #13# #13# Systemic steroids is contraindicated.' IF (ANSWERED anti_steroids AND anti_steroids) ELSE ' '

STRING s_anti_surgery ' ' ' #13# #13# Surgical decompression is contraindicated. ' IF (ANSWERED anti_surgery AND anti_surgery) ELSE ' '

STRING s_anti_radio ' ' ' #13# #13# Orbital radiotherapy is out of question.' IF (ANSWERED anti_radio AND anti_radio) ELSE ' '

{----------} {.....TEDEX_choice is to show TEDEX opinion.....}

STRING s_TEDEX_choice ' ' 'systemic steroids.' IF (ANSWERED c_TEDEX_choice AND c_TEDEX_choice) ELSE s1_TEDEX_choice

STRING s1_TEDEX_choice ' ' 'surgical decompression.' IF (ANSWERED c1_TEDEX_choice AND c1_TEDEX_choice) ELSE s2_TEDEX_choice

STRING s2_TEDEX_choice ' ' 'orbital radiotherapy.' IF (ANSWERED c2_TEDEX_choice AND c2_TEDEX_choice)

[\\\

ANSWERED anti_radio)OR(NOT anti_radio)) ELSE FALSE
{----------}

STRING s_choose_steroids ' ' ' ' IF (ANSWERED anti_steroids AND anti_steroids) ELSE ' #13# Enter 1 ...for steroids. ' STRING s_choose_decompression ' ' ' ' IF (ANSWERED anti_surgery AND anti_surgery) ELSE ' #13# Enter 2 ...for decompression. ' STRING s_choose_radiotherapy ' ' ' ' IF (ANSWERED anti_radio AND anti_radio) ELSE ' #13# Enter 3 ...for radiotherapy. '
{.....}

QUESTION a_i_treat_nerve' #13# As#s_already_said#this patient is #13# almost definitly suffering from optic #13# nerve compression, this is an emergent #13# case, (#s_proptosis#).#s_anti_steroids##s_anti_surgery##s_anti_radio# #13# #13# My first choice is #s_TEDEX_choice# #13# #13# Considering availability and your #13# preference, what is your choice? #13##s_choose_steroids##s_choose_decompression##s_choose_radiotherapy# '

INTEGER 1 3

INVESTIGATE s_anti_steroids s_anti_surgery s_anti_radio s_choose_steroids s_choose_decompression s_choose_radiotherapy s_TEDEX_choice INVESTIGATE a_i_treat_nerve ASSOONAS c_no_ulcer AND (nnnn=4) AND (s_already_said ==' reported before ')

INVESTIGATE s_anti_steroids s_anti_surgery s_anti_radio s_choose_steroids s_choose_decompression s_choose_radiotherapy s_TEDEX_choice

ASK a_i_treat_nerve ASSOONAS (NOT(ANSWERED anti_steroids AND anti_steroids AND ANSWERED anti_surgery AND anti_surgery AND ANSWERED anti_radio AND anti_radio)) AND ((ANSWERED a_c_your_choice_bad? AND NOT a_c_your_choice_bad?))
{.....}{\\\

STRING s1_critical_choice ' ' 'orbital decompressions' IF (anti_steroids AND anti_surgery AND anti_radio) AND ((prop = 2)OR(prop = 3))

QUESTION a_i_critical_choice ' #13# #13# This is a critical situation. This patient #13# has contraindications for systemic steroids #13# treatment, orbital radiotherapy and surgical #13# decompression. However, I recommend #13# #s_critical_choice# treatment with utmost #13# medical care and very close close follow up. #13# #13# Considering the availability, your preference #13# and the above conclusion, what is your final #13# choice ? #13# #13# 1 - Systemic steroids #13# 2 - Surgical decompression #13# 3 - Orbital radiotherapy '

INTEGER 1 3

INVESTIGATE a_i_critical_choice ASSOONAS anti_steroids AND anti_surgery AND anti_radio

{----------}{.....TREAT NERVE.....} REPORT(12) ' #13# #13# It is recommended to start a #13# systemic steroid course. #13# Considerably high dose is #13# required in such cases (80-120mg #13# Prednisone or equivalent). #13# #13# A physician should preferably be #13# involved in the management of #13# this patient. ' ASSOONAS c_tr_nerve_w_steroids AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_nerve_w_steroids ' ' (nnnn=4) AND (((NOT anti_steroids) AND (a_i_treat_nerve = 1))OR ((anti_steroids) AND (a_c_your_choice_bad?) AND (a_i_treat_nerve = 1))OR (a_i_critical_choice = 1))

REPORT(12) ' #13# #13# Arrangements are required for #13# orbital decompression. ' ASSOONAS c_tr_nerve_w_decompression AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_nerve_w_decompression ' ' (nnnn=4) AND (

((NOT anti_surgery) AND (a_i_treat_nerve = 2))OR ((anti_surgery) AND (a_c_your_choice_bad?) AND (a_i_treat_nerve = 2))OR (a_i_critical_choice = 2)

)

REPORT(12) ' #13# #13# Arrangements for a course of #13# orbital radiotherapy are required. #13# The usual dose is 20Gy of super- #13# voltage x-ray divided into 10 #13# fractions over 2 weeks. ' ASSOONAS c_tr_nerve_w_radiotherapy AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_nerve_w_radiotherapy ' ' (nnnn=4) AND (

((NOT anti_radio) AND (a_i_treat_nerve = 3))OR ((anti_radio) AND (a_c_your_choice_bad?)AND (a_i_treat_nerve =3))OR (a_i_critical_choice = 3)

) {$$$

```
CONDITION c_do_not_decompress' ' ((nnnn=4) AND ((prop=2)OR(prop=3)) AND NOT
ANSWERED c_tr_nerve_w_decompression) {.....} STRING
s_lid_condition' ' 'moderate lid shortage' IF (llll=3) ELSE s1_lid_condition

STRING s1_lid_condition' ' 'severe lid shortage' IF (llll=4)

STRING s_lid_A_TEDEX_choice' ' 'surgical decompression' IF ((NOT ANSWERED anti_surgery )
OR (NOT anti_surgery)) ELSE s1_lid_A_TEDEX_choice

STRING s1_lid_A_TEDEX_choice' ' 'lid lengthening procedure' IF (llll=4) AND anti_surgery ELSE
s2_lid_A_TEDEX_choice

STRING s2_lid_A_TEDEX_choice' ' 'Temporary tarsoraphy ' IF (llll=3) AND anti_surgery

STRING s_lid_choose_decomp ' ' ' IF (ANSWERED anti_steroids AND anti_steroids) ELSE
'Enter 3 d ...for decompression'

{.....} QUESTIONa_i_lid_tars_leng_deco'#13# As
#s_lid_already_said# there is #13# #s_lid_condition# #13# #s_proptosis# #13# #s_anti_surgery#
#13,13# My first choice is: #13,13# #s_lid_A_TEDEX_choice# #13# #13# Considering
treatment availability and #13# your preference, what is your choice ? #13,13# 1 - Lid lengthening.
#13# 2 - Tarsoraphy. #13# #s_lid_choose_decomp# ' INTEGER 1 3

INVESTIGATE a_i_lid_tars_leng_deco ASSOONAS ( c_start_treating_lid) AND ( NOT
c_do_not_decompress ) AND ((llll=3) OR (llll=4)) AND ((prop=2)OR(prop=3))

ASK a_i_lid_tars_leng_deco ASSOONAS ( (ANSWERED a_c_lid_bad_choice) AND (NOT
a_c_lid_bad_choice) )

{.....} QUESTIONa_c_lid_bad_choice'#13# I do not fully
agree with you because this#13# is a high risk patient for general anaethesia. #13# #13,13# NOW
#13,13# Do you want me to continue using #13# your choice ? #13# OR#13# Look for
other choices ? #13,13# #13# Enter (y) for CONTINUE#13# Enter (n) for OTHER
CHOICES#13#' YESNO ONLY

INVESTIGATE a_c_lid_bad_choice MAKE s_lid_already_said 'already said' ASSOONAS
(anti_surgery) AND (a_i_lid_tars_leng_deco = 3)

{.....}

STRING s_lid_B_TEDEX_choice' ' 'Temporary tarsorrhaphy' IF (llll=3) ELSE
s1_lid_B_TEDEX_choice

STRING s1_lid_B_TEDEX_choice' ' 'Lid lengthening procedure' IF (llll=4)

QUESTION a_i_lid_tarso_length' #13# #13# #13# My choice is: #s_lid_B_TEDEX_choice# #13#
#13# #13# What is yours ? #13# #13# 1 - Lid lengthening. #13# or #13# 2 -
Tarsorrhaphy. #13# #13# ' INTEGER 1 2 ONLY

INVESTIGATE a_i_lid_tarso_length ASSOONAS (ANSWERED a_i_critical_choice AND NOT
(a_i_critical_choice =2) )OR( (c_start_treating_lid) AND ((llll=3) OR (llll=4)) AND ( (prop=1) OR (
((prop=2)OR(prop=3))AND ( c_do_not_decompress ) ) ) )
{.....} REPORT(9) ' #13# #13# Surgical decompression
```

is #13# indicated to correct the #13# mechanical problem which cuases #13# lid shortage. ' ASSOONAS c_tr_lid_drcompress AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_lid_drcompress ' ' (c_start_treating_lid) AND ((a_i_lid_tars_leng_deco = 3) AND((NOT anti_surgery)OR(a_c_lid_bad_choice)))

REPORT(9) ' #13# #13# You can proceed to lid lengthening #13# procedure. ' ASSOONAS c_tr_lid_lengthening AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_lid_lengthening ' ' (c_start_treating_lid) AND ((a_i_lid_tarso_length = 1) OR (a_i_lid_tars_leng_deco = 1))

REPORT(9) ' #13# #13# You can arrange for temporary #13# tarsorrhaphy. ' ASSOONAS c_tr_tarsoraphy AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_tarsoraphy ' ' (c_start_treating_lid) AND ((a_i_lid_tarso_length = 2) OR (a_i_lid_tars_leng_deco = 2))

REPORT(9)' #13# #13# It is recommended to postpone any #13# lid surgery until decompression #13# is performed, then the lid #13# condition will be reassessed. #13# #13# The cornea should be kept #13# protected and lubricated all the #13# time untill the lid problem is #13# dealt with. ' ASSOONAS c_postpone_lid_tr AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_postpone_lid_tr ' ' ((llll=3) OR (llll=4)) AND ((c_tr_lid_drcompress) OR (c_tr_nerve_w_decompression))

REPORT(9) ' #13# #13# Frequent application of artificial #13# tears is all what you need for #13# this patient at this stage. ' ASSOONAS c_tr_cornea_lid_lubrication AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_tr_cornea_lid_lubrication' ' c_start_treatment AND ((llll=2) OR ((cccc=2) OR (cccc=3)))
{$$$

```
CONDITION c_coping ' ' NOT (a_i_patient_most_troublesome=3)

INVESTIGATE c_coping ASSOONAS (validate_finished OR z_begin) AND (c_start_treating_muscles
AND c_postpone_muscles_surgery )

CONDITION c_do_not_decomp_muscles' ' c_start_treating_muscles AND (ANSWERED
c_do_not_decompress AND c_do_not_decompress ) OR ( ((llll=3)OR(llll=4)) AND
((prop=2)OR(prop=3)) AND (ANSWERED a_i_lid_tars_leng_deco AND NOT
(a_i_lid_tars_leng_deco=3 ))                                    )
{.....}

CONDITION c_any_other_troubles ' ' c_start_treating_muscles AND (llll=2) OR (nnnn=2) OR
(cccc=2)

CONDITION c_muscles_troubles ' ' c_start_treating_muscles AND c_start_treatment AND (mmmm=3)

{.....} [ INVESTIGATE anti_surgery c_muscles_troubles
AND NOT c_any_other_troubles ] {.....}

REPORT(6) ' #13# #13# Before contemplating any muscle #13# surgery, orbital decompression is
#13# first required followed by #13# reassessment of ocular motility. ' ASSOONAS
c_do_deco_first_muscles AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_do_deco_first_muscles ' ' (NOT anti_surgery) AND ( c_muscles_troubles AND NOT
c_any_other_troubles AND                    (ANSWERED c_stable AND c_stable) AND(
((prop=2)OR(prop=3)) AND NOT c_do_not_decomp_muscles )          )

REPORT(6)' #13# #13# Extraocular muscle surgery is #13# required. ' ASSOONAS
c_do_muscles_surgery AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_do_muscles_surgery ' ' (NOT anti_surgery) AND ( c_muscles_troubles AND NOT
c_any_other_troubles AND                    (ANSWERED c_stable AND c_stable) AND ( (
((prop=2)OR(prop=3))AND c_do_not_decomp_muscles) OR (prop=1) )          )

REPORT(6) ' #13# #13# Extraocular muscle surgery is #13# required. ' ASSOONAS
c_do_muscles_surgery_w_care AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_do_muscles_surgery_w_care ' ' (anti_surgery) AND ( c_muscles_troubles AND NOT
c_any_other_troubles AND                    (ANSWERED c_stable AND c_stable) AND ( (
((prop=2)OR(prop=3))AND c_do_not_decomp_muscles) OR (prop=1) )          )

REPORT(6) ' #13# #13# c_postpone_muscles_surgery ?????? #13# ?????????????? ' ASSOONAS
c_postpone_muscles_surgery AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))

CONDITION c_postpone_muscles_surgery ' ' (cccc=4) OR ( (c_start_treatment AND (mmmm=2)) OR
c_muscles_troubles) AND          (c_any_other_troubles OR NOT c_stable) AND(
(ANSWERED c_do_deco_first_muscles AND NOT c_do_deco_first_muscles) AND (ANSWERED
c_do_muscles_surgery AND NOT c_do_muscles_surgery )     )

REPORT(5) ' #13# #13# Occlusion of one eye or the use #13# of prisms is required at this #13#
stage. ' ASSOONAS c_prism_or_occlussion AND ((a_i_final_menu = 1) OR (a_i_final_menu = 2))
```

```
CONDITION c_prism_or_occlussion ' ' c_postpone_muscles_surgery AND (ANSWERED c_coping
AND NOT c_coping)

REPORT(5) ' #13# #13#  No treatment is required for the #13#  ocular motility  disturbance  at #13#
this stage. ' ASSOONAS c_do_nothing_for_muscles AND  ((a_i_final_menu = 1) OR (a_i_final_menu =
2))

CONDITION c_do_nothing_for_muscles ' ' c_postpone_muscles_surgery AND (ANSWERED
c_coping AND c_coping)

{$$$
```

for #a_i_eye_disease_duration# months. #13# ' ASSOONAS (a_i_final_menu = 1) OR (a_i_final_menu = 2)

REPORT(114)' 4 #13# #13# Relevant present and past history: #13# _____ #13# #13# * The following treatment recieved #13# for the occular condition: #s_Eye_lubricants?##s_Eye_lub_effect?# #s_Tr_f_cr_ulcer?##s_Tr_c_ulcer_effect# #s_Lid_lengthening?##s_Lid_leng_effect# #s_Tarsoraphy?##s_Tarsor_effect# #s_Systemic_steroids?##s_steroids_effect# #s_Radiotherapy?##s_Radiotherapy_effect# #s_decompression?##s_decompression_effect# #s_Prisms_occlussion?##s_Prisms_occl_effect# #s_Muscle_surgery?##s_Muscle_surg_effect# #13# #13# * Diagnosis of #s_thyroid_status# has been made #13# #a_i_thyroid_disease_duration# months ago. #13# #13# * Thyroid dysfunction treated by: #s_Radioactive_iodine# #s_Thyroidectomy# #s_Carbimazol# #13,13# #13# ' REPORT(112)' 5 #13# #13# Clinical findings : Right eye Left eye #13# _____ #13# #13# Snellens acuity - #s_snellen_now# - ..... #13# Lid retraction - #s_lid_retract# - ..... #13# Lid lag - #s_lid_lag# - ..... #13# #13# #13# Soft-tissues changes: #13# _____ #13# #13# Lid eodema - #s_lid_eodema# - ..... #13# Chemosis - #s_chemosis# - ..... #13# Cornea - #s_cornea# - ..... #13# Pupillary reactions - #s_pupill# - ..... #13# #13# #13#

' ASSOONAS (a_i_final_menu = 1) OR (a_i_final_menu = 2)

REPORT(110)'6 #13# Ophthalmoscopy #13# _____ #13# #13# - #s_disk_eodema# - ..... #13# - #s_coroidal_fld# - ..... #13# #13# Intraocular Pressure: #13# _____ #13# #13# Straight - #a_i_IOP_straight# - ..... #13# In up gaze - #a_i_IOP_up# - ..... #13# Delta I.O.P - #n_IOP_dif# - ..... #13# Exophalmometrty - #a_i_proptosis_now# - ..... #13# #13# #13# #13# Extra-ocular motility: #s_diplopia_on_examination# #13# #13# #13# Effect of the eye problem on the #13# patient''s appearance: #s_cosmetic_appearance# #13# #13# '

REPORT(108)'7 #13# #13# Results of the most recent investigations #13# _____ #13# #13# #13# #13# VISUSL FUNCTIONS: #13# _____ #13# #13# Field of vision : - #s_field_comment# - s_field #13# Colour vision : - a_i_hue - a_i_hue #13# (100-Hue score) #13# #13# #13# #13# ORBITAL IMAGING: #13# _____ #13# #13# Ultrasound: - #s_ultra_sound_comt# - ..... #13# C.T.scan: - #s_CTscan_commenter# - ..... #13# M.R.I.scan: - #s_MRIscan_commentr# -..... #13# '

REPORT(106)' 8 #13# #13# Thyroid Biochemistry: #13# _____ #13# #13# Serum T3: - #a_i_T3# #13# Serum T4: - #a_i_T4# #13# #13# T.S.H: - #a_i_TSH# #13# ' ASSOONAS (a_i_final_menu = 1) OR (a_i_final_menu = 2)
{$$$

STRING s4_user_experience' ' 'GP ' IF (ANSWERED m_a_i_user_experience AND
(m_a_i_user_experience = 5)) ELSE s5_user_experience

STRING s5_user_experience' ' 'Student ' IF (ANSWERED m_a_i_user_experience AND
(m_a_i_user_experience = 6))

{::} STRING s_lacrimination' ' '#13# -
lacrimination ' IF (ANSWERED a_c_lacrimination? AND a_c_lacrimination?) ELSE ' '

STRING s_photophobia' ' '#13# - photophobia ' IF (ANSWERED a_c_photophobia?
AND a_c_photophobia?) ELSE ' '

STRING s_blurring' ' '#13# - blurring ' IF (ANSWERED a_c_visual_blurring? AND
a_c_visual_blurring?) ELSE ' '

STRING s_double_vision' ' '#13# - double vision ' IF (ANSWERED a_c_double_vision?
AND a_c_double_vision?) ELSE ' '

STRING s_pain' ' '#13# - pain ' IF (ANSWERED a_c_pain? AND a_c_pain?) ELSE ' '

{::} CONDITION c_more_than_2_symtoms' '
VOTES(2,a_c_lacrimination?,a_c_photophobia?,a_c_visual_blurring?,
a_c_double_vision?,a_c_pain?)

{::}

STRING s_Eye_lubricants? ' ' '#13# - Eye lubricants' IF (ANSWERED a_c_Eye_lubricants?
AND a_c_Eye_lubricants?) ELSE ' '

{.....}

STRING s_Tr_f_cr_ulcer? ' ' '#13# - Treatment for ulcer' IF (ANSWERED
a_c_Tr_for_corneal_ulcer? AND a_c_Tr_for_corneal_ulcer?) ELSE ' '

{.....}

STRING s_Lid_lengthening? ' ' '#13# - Lid lengthening operation' IF (ANSWERED
a_c_Lid_lengthening? AND a_c_Lid_lengthening?) ELSE ' '

{.....}

STRING s_Tarsoraphy? ' ' '#13# - Tarsoraphy' IF (ANSWERED a_c_Tarsorhaphy? AND
a_c_Tarsorhaphy?) ELSE ' '

{.....}

STRING s_Systemic_steroids? ' ' '#13# - Systemic steroids' IF (ANSWERED
a_c_Systemic_steroids? AND a_c_Systemic_steroids?) ELSE ' '

{.....}

STRING s_Radiotherapy? ' ' '#13# - Radiotherapy' IF (ANSWERED a_c_Radiotherapy? AND a_c_Radiotherapy?) ELSE ' '

{.....}

STRING s_decompression? ' ' '#13# - decompression' IF (ANSWERED a_c_decompression? AND a_c_decompression?) ELSE ' '

{.....}

STRING s_Prisms_occlussion? ' ' '#13# - Prisms\occlussion' IF (ANSWERED a_c_Prisms_occlusion? AND a_c_Prisms_occlusion?) ELSE ' '

{.....}

STRING s_Muscle_surgery? ' ' '#13# - Muscle surgery' IF (ANSWERED a_c_Muscle_surgery? AND a_c_Muscle_surgery?) ELSE ' '

{::::::

STRING s_Tarsor_effect ' ' (This proved to be successful)' IF (ANSWERED
a_i_Tarsorhaphy_effect? AND (a_i_Tarsorhaphy_effect? = 1)) ELSE s1_Tarsor_effect

STRING s1_Tarsor_effect ' ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_Tarsorhaphy_effect? AND (a_i_Tarsorhaphy_effect? = 2)) ELSE s2_Tarsor_effect

STRING s2_Tarsor_effect ' ' (This resulted in side effect)' IF (ANSWERED
a_i_Tarsorhaphy_effect? AND (a_i_Tarsorhaphy_effect? = 3)) ELSE ' '

{.....}

STRING s_steroids_effect ' ' (This proved to be successful)' IF (ANSWERED
a_i_Sys_steroids_effect? AND (a_i_Sys_steroids_effect? = 1)) ELSE s1_steroids_effect

STRING s1_steroids_effect ' ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_Sys_steroids_effect? AND (a_i_Sys_steroids_effect? = 2)) ELSE s2_steroids_effect

STRING s2_steroids_effect ' ' (This resulted in side effect)' IF (ANSWERED
a_i_Sys_steroids_effect? AND (a_i_Sys_steroids_effect? = 3)) ELSE ' '

{.....}

STRING s_Radiotherapy_effect ' ' (This proved to be successful)' IF (ANSWERED
a_i_Radiotherapy_effect? AND (a_i_Radiotherapy_effect? = 1)) ELSE s1_Radiotherapy_effect

STRING s1_Radiotherapy_effect ' ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_Radiotherapy_effect? AND (a_i_Radiotherapy_effect? = 2)) ELSE s2_Radiotherapy_effect

STRING s2_Radiotherapy_effect ' ' (This resulted in side effect)' IF (ANSWERED
a_i_Radiotherapy_effect? AND (a_i_Radiotherapy_effect? = 3)) ELSE ' '

{.....}

STRING s_decompression_effect ' ' (This proved to be successful)' IF (ANSWERED
a_i_decompression_effect? AND (a_i_decompression_effect? = 1)) ELSE s1_decompression_effect

STRING s1_decompression_effect ' ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_decompression_effect? AND (a_i_decompression_effect? = 2)) ELSE s2_decompression_effect

STRING s2_decompression_effect ' ' (This resulted in side effect)' IF (ANSWERED
a_i_decompression_effect? AND (a_i_decompression_effect? = 3)) ELSE ' '

{.....}

STRING s_Prisms_occl_effect ' ' (This proved to be successful)' IF (ANSWERED
a_i_Prisms_occl_effect? AND (a_i_Prisms_occl_effect? = 1)) ELSE s1_Prisms_occl_effect

STRING s1_Prisms_occl_effect ' ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_Prisms_occl_effect? AND (a_i_Prisms_occl_effect? = 2)) ELSE s2_Prisms_occl_effect

```
STRING s2_Prisms_occl_effect ' ' (This resulted in side effect)' IF (ANSWERED
a_i_Prisms_occl_effect? AND (a_i_Prisms_occl_effect? = 3)) ELSE ' '

{.....}

STRING  s_Muscle_surg_effect '  ' (This proved to be successful)' IF (ANSWERED
a_i_Muscle_surg_effect? AND (a_i_Muscle_surg_effect? = 1)) ELSE s1_Muscle_surg_effect

STRING  s1_Muscle_surg_effect '  ' (This proved to be unsuccessful)' IF (ANSWERED
a_i_Muscle_surg_effect? AND (a_i_Muscle_surg_effect? = 2)) ELSE  s2_Muscle_surg_effect

STRING  s2_Muscle_surg_effect '  ' (This resulted in side effect)' IF (ANSWERED
a_i_Muscle_surg_effect? AND (a_i_Muscle_surg_effect? = 3)) ELSE ' '

{.....}

STRING s_thyroid_status '  ' 'Euthyroid' IF (ANSWERED a_i_thyroid_status AND
(a_i_thyroid_status = 2)) ELSE s1_thyroid_status

STRING s1_thyroid_status '  ' 'Hyperthroid' IF (ANSWERED a_i_thyroid_status AND
(a_i_thyroid_status = 3)) ELSE  s2_thyroid_status

STRING s2_thyroid_status '  ' 'Hypothyroid' IF (ANSWERED a_i_thyroid_status AND
(a_i_thyroid_status = 1))

{:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_Radioactive_iodine '  ' '#13#          - Radioactive iodine' IF (ANSWERED
a_c_Radioactive_iodine? AND a_c_Radioactive_iodine? ) ELSE ' '

{.....}

STRING s_Thyroidectomy '  ' '#13#          - Thyroidectomy' IF (ANSWERED
a_c_Thyroidectomy?  AND  a_c_Thyroidectomy? ) ELSE '  '

{.....}

STRING s_Carbimazol '  ' '#13#          - Carbimazol       ' IF (ANSWERED a_c_Carbimazol?
AND  a_c_Carbimazol? ) ELSE ' '

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::} STRING s_snellen_now '  ' '6/5       ' IF
(ANSWERED a_i_snellen_now  AND (a_i_snellen_now = 1) ) ELSE  s1_snellen_now

STRING s1_snellen_now '  ' '6/6       ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
2) ) ELSE  s2_snellen_now

STRING s2_snellen_now '  ' '6/9       ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
3) ) ELSE  s3_snellen_now

STRING s3_snellen_now '  ' '6/12      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
4) ) ELSE  s4_snellen_now
```

```
STRING s4_snellen_now '    ' '6/18      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
5) ) ELSE  s5_snellen_now

STRING s5_snellen_now '    ' '6/24      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
6) ) ELSE  s6_snellen_now

STRING s6_snellen_now '    ' '6/36      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
7) ) ELSE  s7_snellen_now

STRING s7_snellen_now '    ' '6/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
8) ) ELSE  s8_snellen_now

STRING s8_snellen_now '    ' '5/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
9) ) ELSE  s9_snellen_now

STRING s9_snellen_now '    ' '4/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now =
10) ) ELSE  s10_snellen_now

STRING s10_snellen_now '    ' '3/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now
= 11) ) ELSE  s11_snellen_now

STRING s11_snellen_now '    ' '2/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now
= 12) ) ELSE  s12_snellen_now

STRING s12_snellen_now '    ' '1/60      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now
= 13) ) ELSE  s13_snellen_now

STRING s13_snellen_now '    ' 'Coun. fingers' IF (ANSWERED a_i_snellen_now  AND
(a_i_snellen_now = 14) ) ELSE  s14_snellen_now

STRING s14_snellen_now '    ' 'M.H.      ' IF (ANSWERED a_i_snellen_now  AND
(a_i_snellen_now = 15) ) ELSE  s15_snellen_now

STRING s15_snellen_now '    ' 'P.L.      ' IF (ANSWERED a_i_snellen_now  AND (a_i_snellen_now
= 16) ) ELSE s16_snellen_now

STRING s16_snellen_now '    ' 'N.P.L.    ' IF (ANSWERED a_i_snellen_now  AND
(a_i_snellen_now = 17) )

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::} STRING s_lid_retract '    ' '-(1.5 - 2.0) ' IF
(ANSWERED a_i_lid_retraction AND (a_i_lid_retraction = 1)) ELSE  s1_lid_retract

STRING s1_lid_retract '    ' '(0.00)    ' IF (ANSWERED a_i_lid_retraction AND (a_i_lid_retraction =
2)) ELSE  s2_lid_retract

STRING s2_lid_retract '    ' '(1.0 - 3.0)  ' IF (ANSWERED a_i_lid_retraction AND (a_i_lid_retraction =
3)) ELSE  s3_lid_retract

STRING s3_lid_retract '    ' '(4.0 - 6.0)  ' IF (ANSWERED a_i_lid_retraction AND (a_i_lid_retraction =
4))

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}
```

```
STRING s_lid_lag '    ' 'YES     ' IF (ANSWERED a_c_lid_lag AND a_c_lid_lag) ELSE  s1_lid_lag

STRING s1_lid_lag '    ' 'NO      ' IF (ANSWERED a_c_lid_lag AND NOT a_c_lid_lag)

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_lid_eodema '    ' 'No eodema   ' IF (ANSWERED a_i_lid_eodema_now AND
(a_i_lid_eodema_now = 1)) ELSE s1_lid_eodema

STRING s1_lid_eodema '    ' 'Mild      ' IF (ANSWERED a_i_lid_eodema_now AND
(a_i_lid_eodema_now = 2)) ELSE s2_lid_eodema

STRING s2_lid_eodema '    ' 'Moderate    ' IF (ANSWERED a_i_lid_eodema_now AND
(a_i_lid_eodema_now = 3)) ELSE s3_lid_eodema

STRING s3_lid_eodema '    ' 'Severe     ' IF (ANSWERED a_i_lid_eodema_now AND
(a_i_lid_eodema_now = 4))

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_chemosis '    ' 'No eodema ' IF (ANSWERED a_i_chemosis_now AND (a_i_chemosis_now
= 1)) ELSE s1_chemosis

STRING s1_chemosis '    ' 'Mild     ' IF (ANSWERED a_i_chemosis_now AND (a_i_chemosis_now =
2)) ELSE s2_chemosis

STRING s2_chemosis '    ' 'Moderate  ' IF (ANSWERED a_i_chemosis_now AND (a_i_chemosis_now
= 3)) ELSE s3_chemosis

STRING s3_chemosis '    ' 'Severe    ' IF (ANSWERED a_i_chemosis_now AND (a_i_chemosis_now =
4))

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_cornea '    ' 'Clear   ' IF (ANSWERED a_i_cornea_now AND (a_i_cornea_now = 1)) ELSE
s1_cornea

STRING s1_cornea '    ' 'Stippl. ' IF (ANSWERED a_i_cornea_now AND (a_i_cornea_now = 2)) ELSE
s2_cornea

STRING s2_cornea '    ' 'Ulcer   ' IF (ANSWERED a_i_cornea_now AND (a_i_cornea_now = 3))
ELSE s3_cornea

STRING s3_cornea '    ' 'Nec/Perf' IF (ANSWERED a_i_cornea_now AND (a_i_cornea_now = 4))
ELSE s4_cornea

STRING s4_cornea '    ' 'Scarring' IF (ANSWERED a_i_cornea_now AND (a_i_cornea_now = 5))

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}
```

STRING s_pupill ' ' 'Normal ' IF (ANSWERED a_i_pupill_now AND (a_i_pupill_now = 1)) ELSE s1_pupill

STRING s1_pupill ' ' 'Afferent' IF (ANSWERED a_i_pupill_now AND (a_i_pupill_now = 2))

{::::::

```
STRING s_field_comment '    ' 'Normal       ' IF (ANSWERED a_i_field_now AND (a_i_field_now =
1)) ELSE s1_field

STRING s1_field '    ' 'Prob. normal   ' IF (ANSWERED a_i_field_now AND (a_i_field_now = 2))
ELSE s2_field

STRING s2_field '    ' 'Suggestive     ' IF (ANSWERED a_i_field_now AND (a_i_field_now = 3))
ELSE s3_field

STRING s3_field '    ' 'Typical        ' IF (ANSWERED a_i_field_now AND (a_i_field_now = 4)) ELSE
'No data       '

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_ultra_sound_comt '    ' 'No data          ' IF (ANSWERED a_i_ultra_sound AND
(a_i_ultra_sound = 0)) ELSE s1_ultra_sound

STRING s1_ultra_sound '    ' 'Normal thickened  ' IF (ANSWERED a_i_ultra_sound AND
(a_i_ultra_sound = 1)) ELSE s2_ultra_sound

STRING s2_ultra_sound '    ' 'Moderate thickened' IF (ANSWERED a_i_ultra_sound AND
(a_i_ultra_sound = 2)) ELSE s3_ultra_sound

STRING s3_ultra_sound '    ' 'Markedly thickened' IF (ANSWERED a_i_ultra_sound AND
(a_i_ultra_sound = 3)) ELSE s4_ultra_sound

STRING s4_ultra_sound '    ' 'Swollen        ' IF (ANSWERED a_i_ultra_sound AND (a_i_ultra_sound
= 4)) ELSE 'No data       '

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_CTscan_commenter '    ' 'No data          ' IF (ANSWERED a_i_CTscan AND (a_i_CTscan
= 0)) ELSE s1_CTscan

STRING s1_CTscan '    ' 'Normal          ' IF (ANSWERED a_i_CTscan AND (a_i_CTscan = 1)) ELSE
s2_CTscan

STRING s2_CTscan '    ' 'Moderate thickened' IF (ANSWERED a_i_CTscan AND (a_i_CTscan = 2))
ELSE s3_CTscan

STRING s3_CTscan '    ' 'Markedly thickened' IF (ANSWERED a_i_CTscan AND (a_i_CTscan = 3))
ELSE s4_CTscan

STRING s4_CTscan '    ' 'Swollen         ' IF (ANSWERED a_i_CTscan AND (a_i_CTscan = 4)) ELSE
'No data       '

{::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::}

STRING s_MRIscan_commentr '    ' 'No data          ' IF (ANSWERED a_i_MRIscan AND
(a_i_MRIscan = 1)) ELSE s1_MRIscan
```

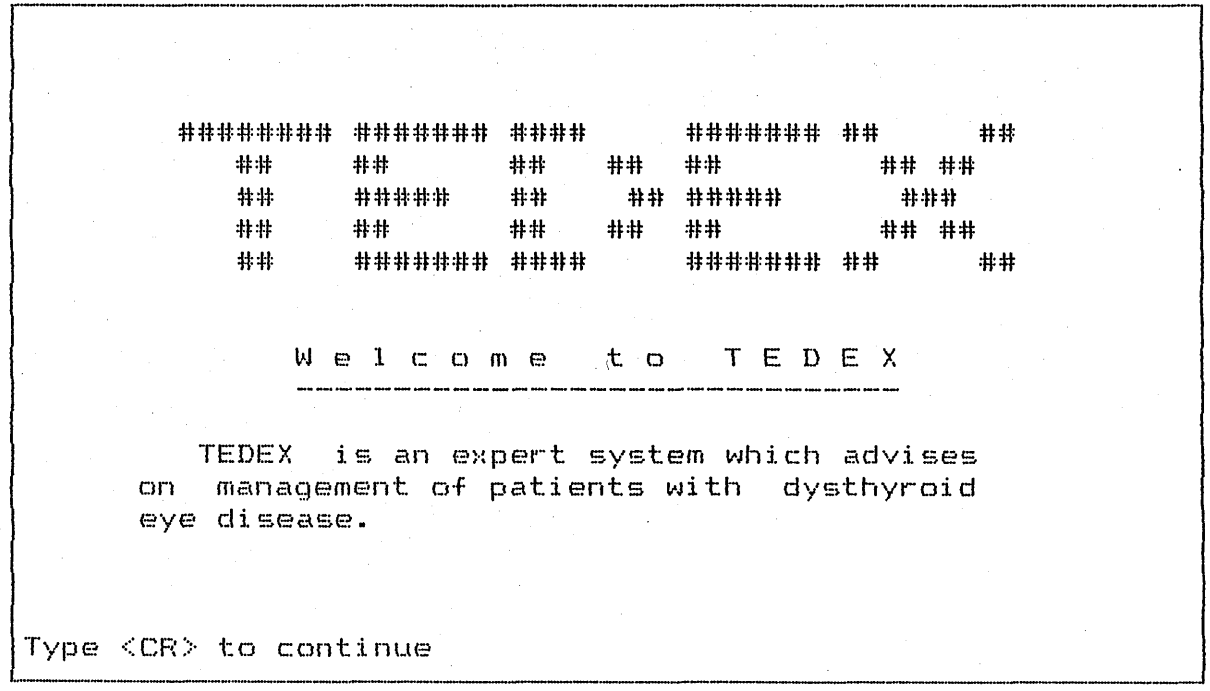
```
STRING s1_MRIscan '    ' 'Normal          ' IF (ANSWERED a_i_MRIscan AND (a_i_MRIscan = 2))
ELSE s2_MRIscan

STRING s2_MRIscan '    ' 'Moderate thickened' IF (ANSWERED a_i_MRIscan AND (a_i_MRIscan =
3)) ELSE s3_MRIscan

STRING s3_MRIscan '    ' 'Markedly thickened' IF (ANSWERED a_i_MRIscan AND (a_i_MRIscan =
4)) ELSE s4_MRIscan

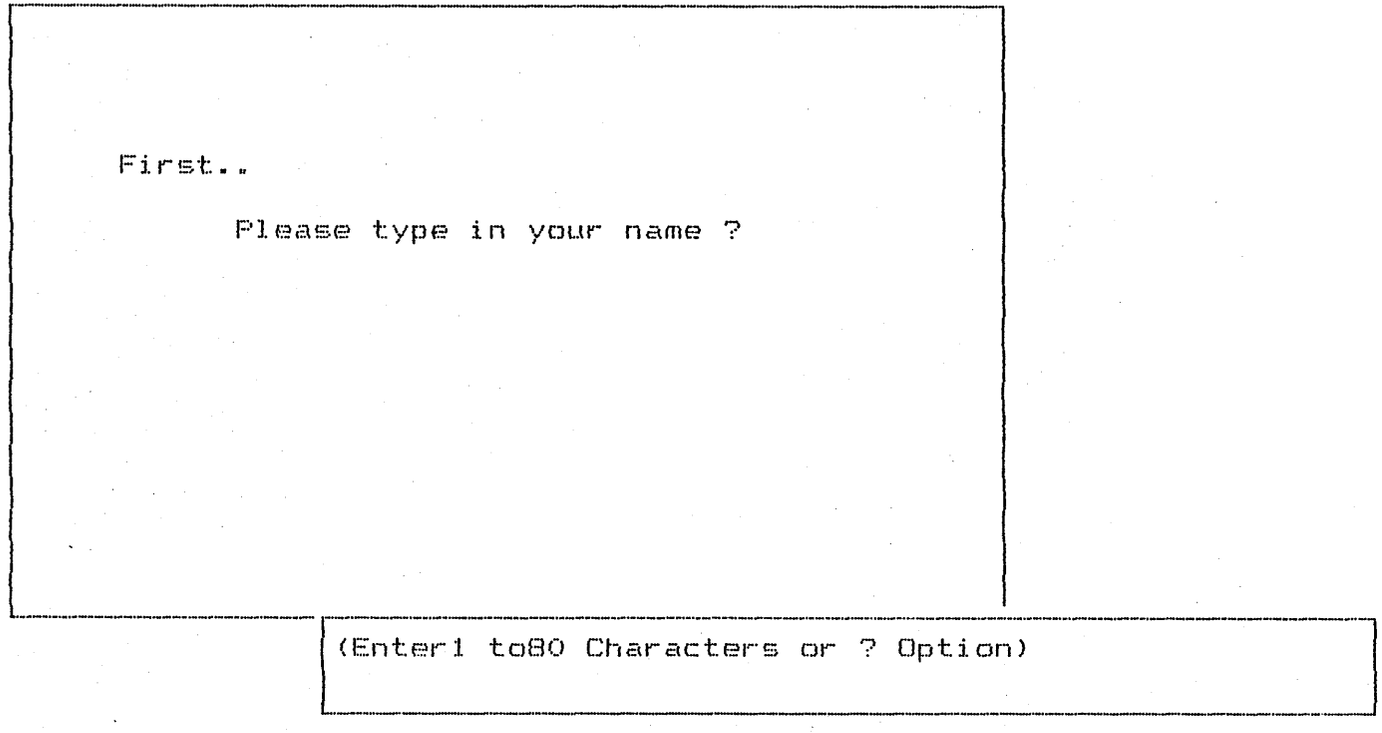
STRING s4_MRIscan '    ' 'Swollen         ' IF (ANSWERED a_i_MRIscan AND (a_i_MRIscan = 5))
ELSE 'No data          '
```

Appendix D3 - Print out of system-user dialogue


Welcome to TEDEX
TEDEX is an expert system which advises on management of patients with dysthyroid eye disease.
Type <CR> to continue

Have you used TEDEX before ?

(Y..!..N or an option)


First..
Please type in your name ?
(Enter1 to80 Characters or ? Option)

Are you ..

(1) Consultant Ophthalmologist.
(2) Senior Registrar in Ophthalmology.
(3) Registrar in Ophthalmology.
(4) Senior House Officer/House officer.
(5) Endocrinologist.
(6) GP.

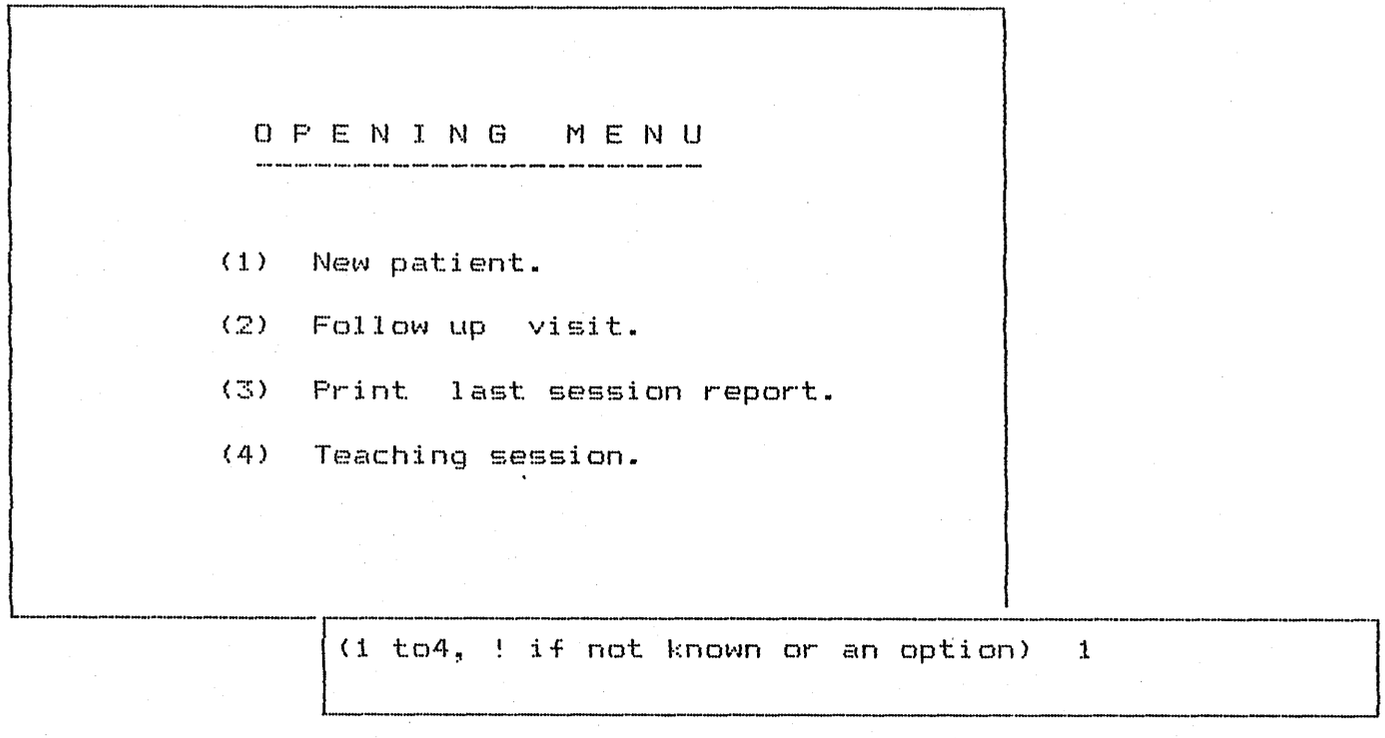
(7) Student.
(8) Patient.

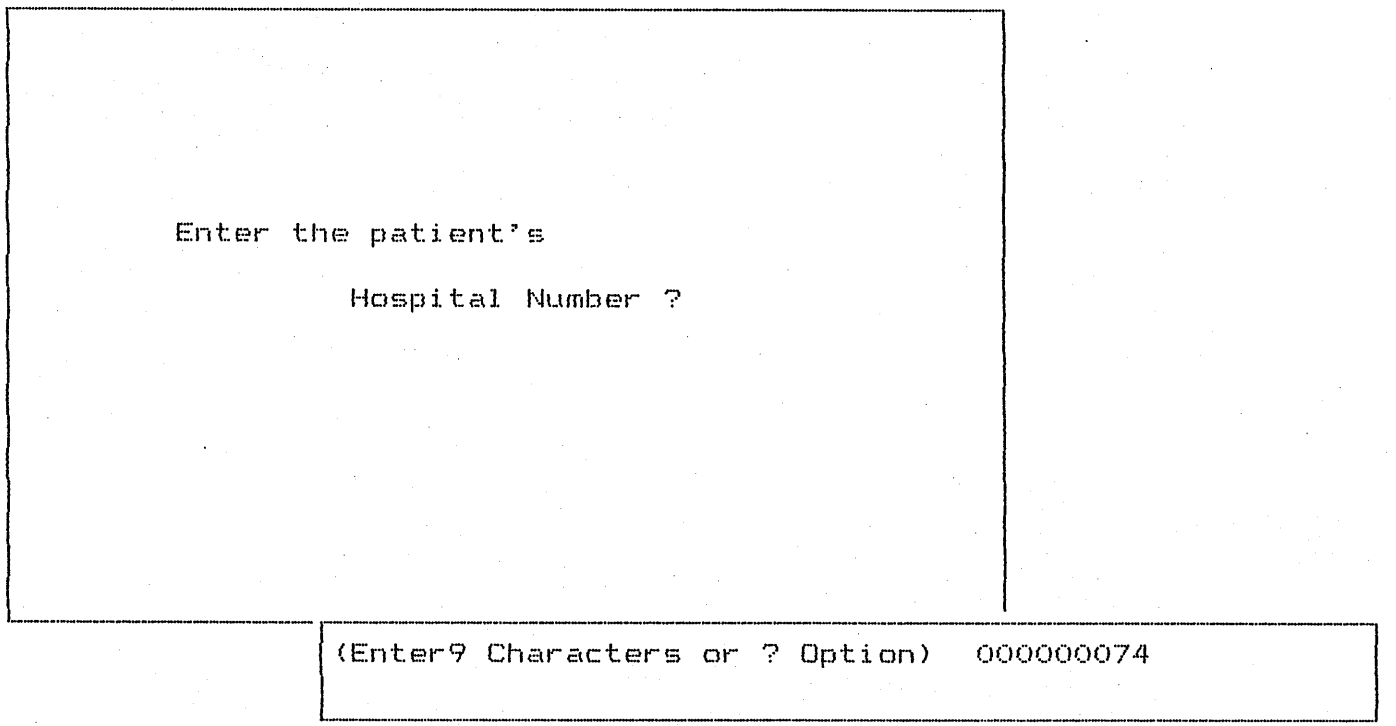
(1 to7, ! if not known or an option) 3

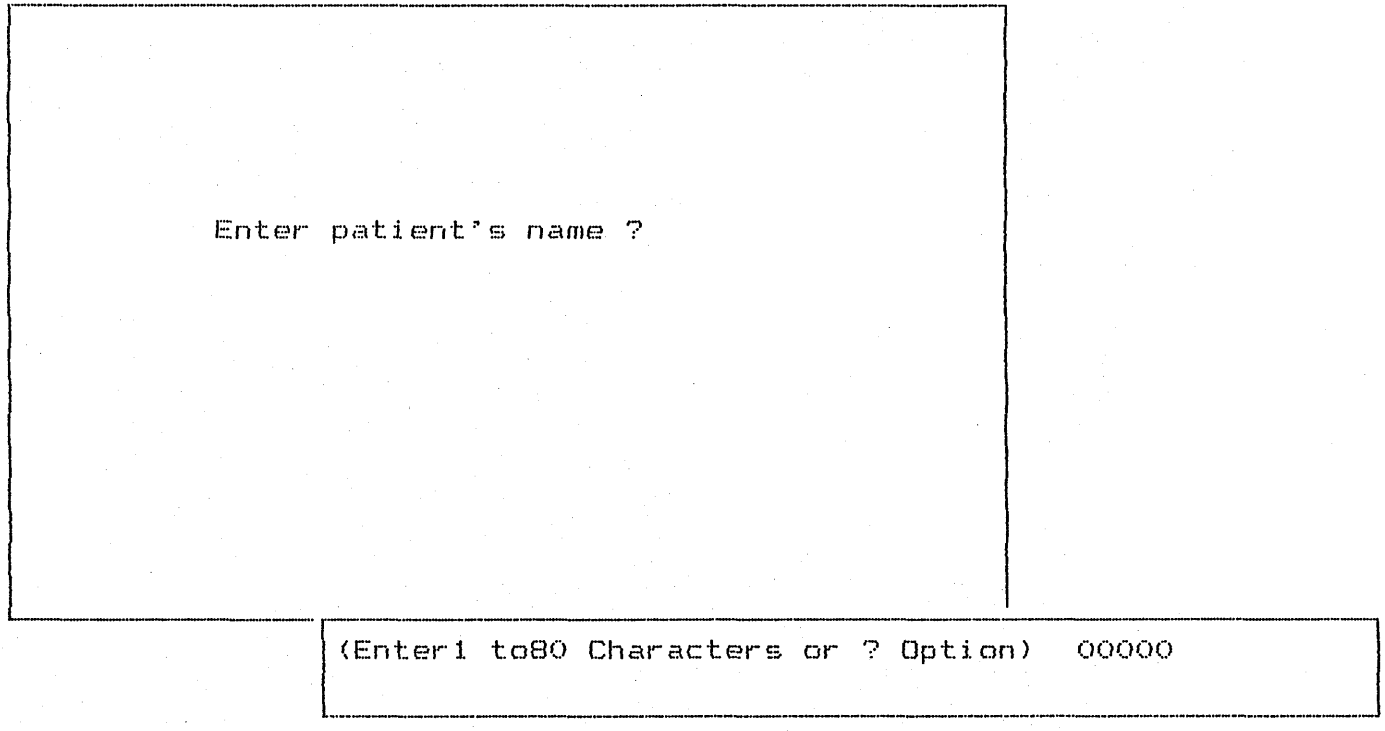
Now Dr. ZEINI

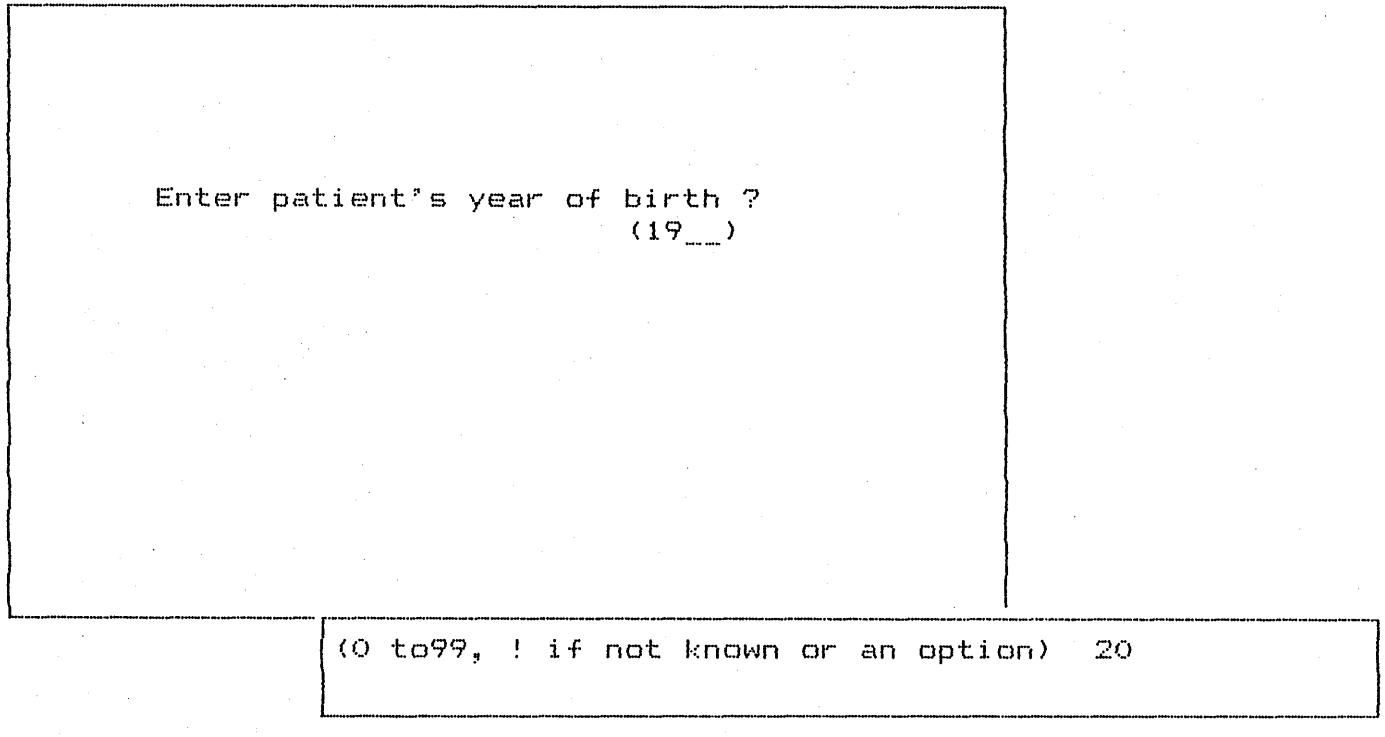
Please type in the personal information and the medical history of your patient.

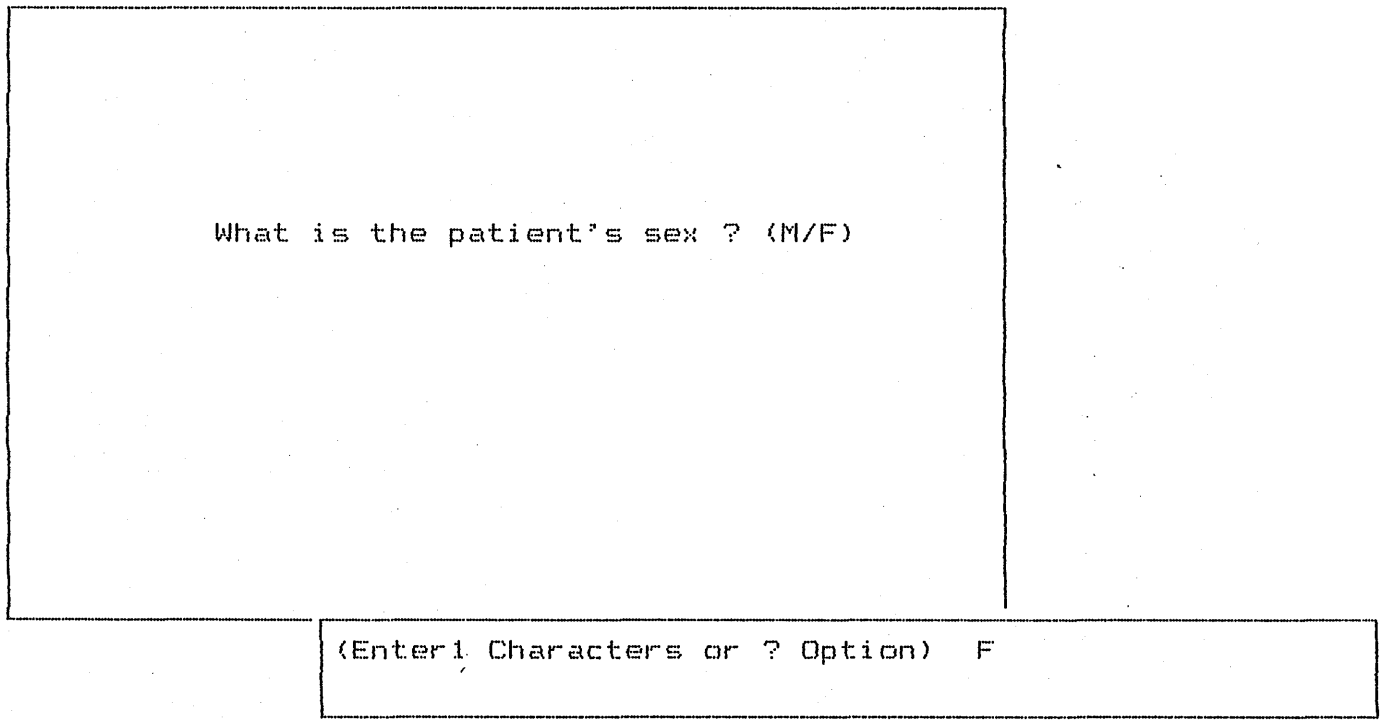
Type <CR> to continue


O P E N I N G M E N U
(1) New patient.
(2) Follow up visit.
(3) Print last session report.
(4) Teaching session.
(1 to4, ! if not known or an option) 1


Enter the patient's
Hospital Number ?
(Enter9 Characters or ? Option) 000000074


Enter patient's name ?
(Enter1 to80 Characters or ? Option) 00000


Enter patient's year of birth ?
(19__)
(0 to99, ! if not known or an option) 20


What is the patient's sex ? (M/F)
(Enter1 Characters or ? Option) F

Patient complaint:

1 - Lacrimation.
2 - Photophobia.
3 - Blurring of vision.
4 - Double vision.
5 - Pain.

Does the patient suffer from

Lacrimation ? (Y/N)

(Y..!..N or an option) y

Patient complaint:

1 - Lacrimation.
2 - Photophobia.
3 - Blurring of vision.
4 - Double vision.
5 - Pain.

Does the patient suffer from

Photophobia ? (Y/N)

(Y..!..N or an option) y

Patient complaint:

1 - Lacrimation.
2 - Photophobia.
3 - Blurring of vision.
4 - Double vision.
5 - Pain.

Does the patient suffer form

Blurring of vision ? (Y/N)

(Y..!..N or an option) n

Patient complaint:

1 - Lacrimation.
2 - Photophobia.
3 - Blurring of vision.
4 - Double vision.
5 - Pain.

Does the patient suffer from

Double vision ? (Y/N)

(Y..!..N or an option) n

Patient complaint:

1 - Lacrimation.
2 - Photophobia.
3 - Blurring of vision.
4 - Double vision.
5 - Pain.

Does the patient suffer from

Pain ? (Y/N)

(Y..!..N or an option) n

Which symptom is the most troublesome

to the patient ?

(1) Cosmetic appearance.

(2) Blurring of vision.
(3) Double vision.

(4) Pain / lacrimation / photophobia.

(1 to4, ! if not known or an option) 4

What is the status of the thyroid ?

(1) Hyperthyroid.

(2) Hypothyroid.

(3) Euthyroid.

(1 to3, ! if not known or an option) 1

How long is it since the first

thyroid disease symptoms ?

(in month)

(1 to300, ! if not known or an option) 1

Systemic conditions

1 - Diabetes.
2 - Hypertension.
3 - Renal disease.
4 - Pulmonary disease.
5 - GI disease.

Is the patient Diabetic ? (Y/N)

(Y or N or an option) n

Systemic conditions

1 - Diabetes.
2 - Hypertension.
3 - Renal disease.
4 - Pulmonary disease.
5 - GI disease.

Is the patient Hypertensive ? (Y/N)

(Y or N or an option) n

Systemic conditions

1 - Diabetes.
2 - Hypertension.
3 - Renal disease.
4 - Pulmonary disease.
5 - GI disease.

Does the patient suffer from any
renal disease ? (Y/N)

(Y or N or an option) n

Systemic conditions

1 - Diabetes.
2 - Hypertension.
3 - Renal disease.
4 - Pulmonary disease.
5 - GI disease.

Does the patient suffer from any
pulmonary diseases ? (Y/N)

(Y or N or an option) n

Systemic conditions

1 - Diabetes.
2 - Hypertension.
3 - Renal disease.
4 - Pulmonary disease.
5 - GI disease.

Does the patient suffer from any
gastero-intestinal disease ? (Y/N)

(Y or N or an option) n

Previous thyroid treatment:

1 - Radioactive iodine.
2 - Thyroidectomy.
3 - Carbimazole.

Has the patient been treated by
Radioactive Iodine ? (Y/N)

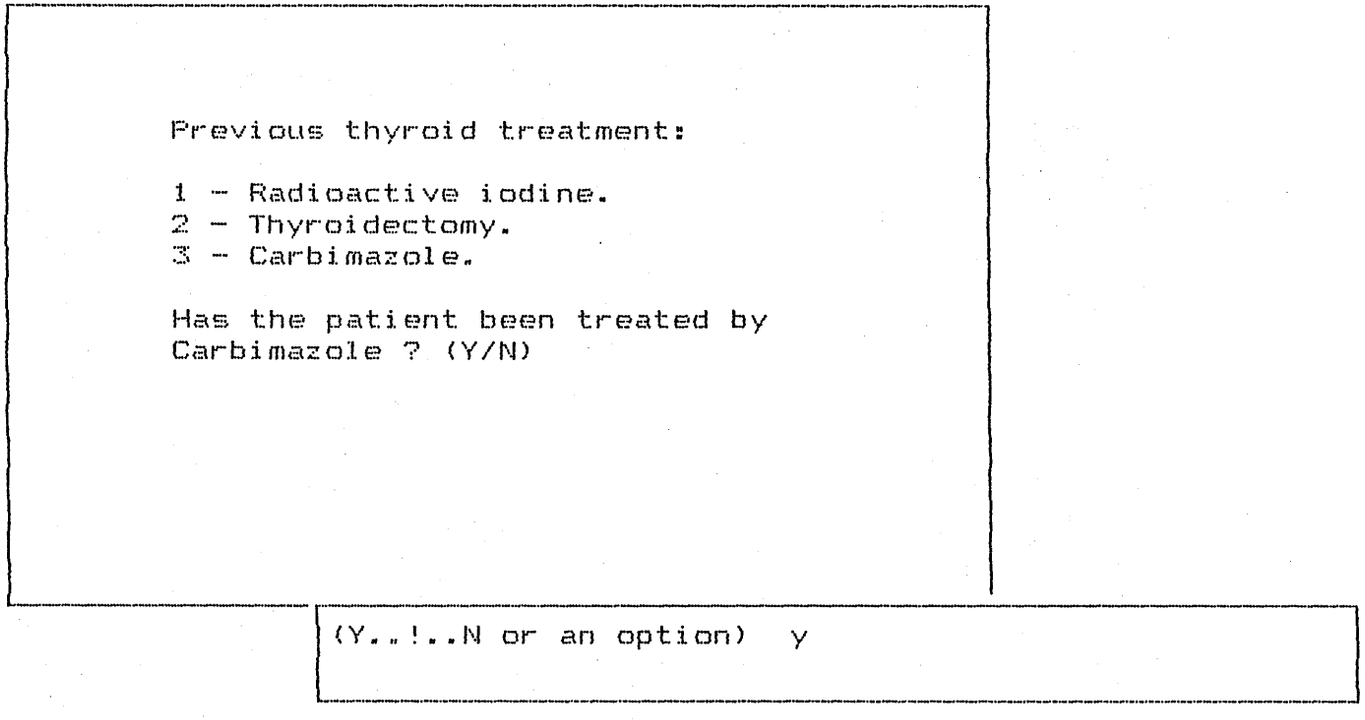
(Y..!..N or an option) n

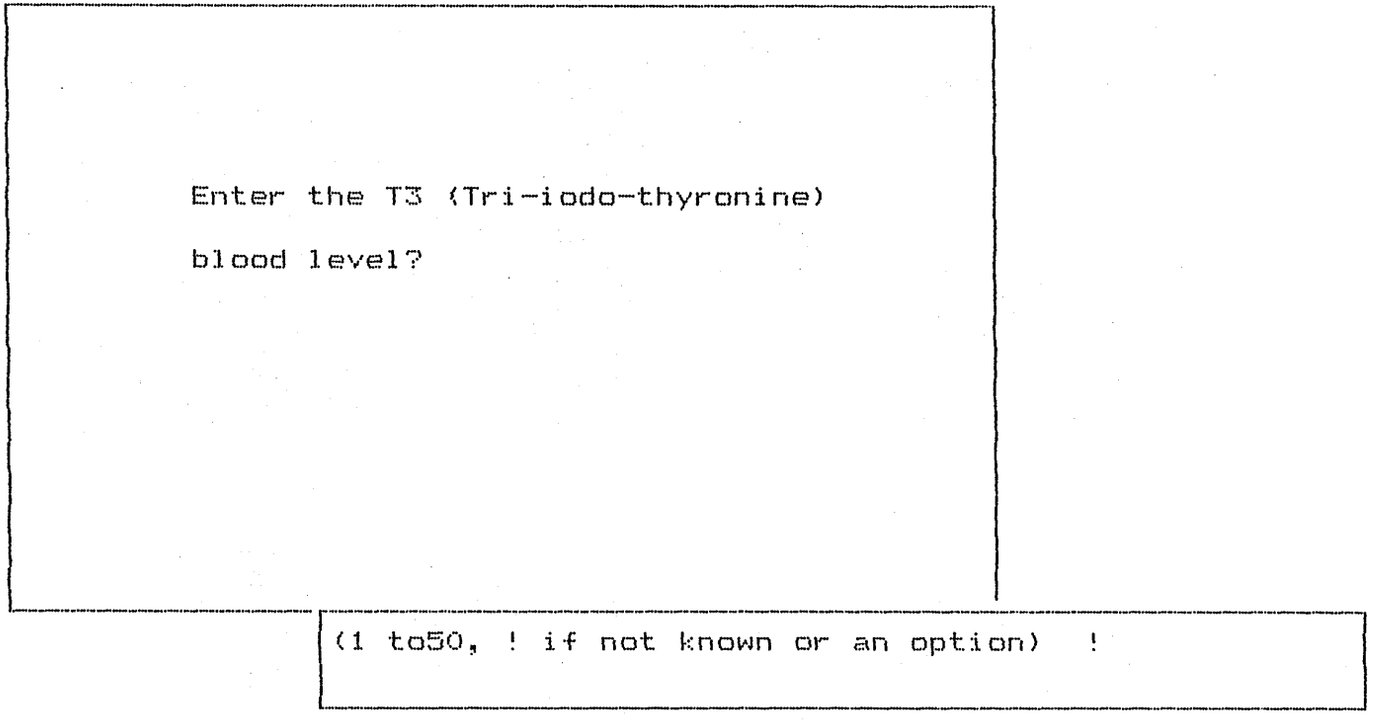
Previous thyroid treatment:

1 - Radioactive iodine.
2 - Thyroidectomy.
3 - Carbimazole.

Has the patient been treated by
Thyroidectomy ? (Y/N)

(Y..!..N or an option) n


Previous thyroid treatment:
1 - Radioactive iodine.
2 - Thyroidectomy.
3 - Carbimazole.
Has the patient been treated by
Carbimazole ? (Y/N)
(Y..!..N or an option) y


Enter the T3 (Tri-iodo-thyronine)
blood level?
(1 to50, ! if not known or an option) !

Enter The T4 (Thyroxin)

blood level ?

(1 to50, ! if not known or an option) !

Enter the TSH (Thyroid Stimulation Hormone)

assay result ?

(1 to50, ! if not known or an option) !

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - Decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient use Eye lubricants (Y/N) ?

(Y..!..N or an option) y

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - Decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

What was the result of Eye lubricant treatment?

1 - Sucess (improvement).
2 - Failure (or minimal effect).
3 - Side effects.

(1 to3, ! if not known or an option) 1

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient recieve treatment for
corneal ulcer (Y/N) ?

(Y..!..N or an option) n

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Does the patient have previous Lid lengthening procedure (Y/N) ?

(Y..!..N or an option) n

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient have previous Tarsorrhaphy(Y/N)?

(Y..!..N or an option) n

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroid.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient receive Systemic steroids
(Y/N)?

(Y..!..N or an option) n

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient have orbital Radiotherapy (Y/N)?

(Y..!..N or an option) n

```
Previous eye treatment:

      1 - Eye lubricants.
      2 - Treatment for corneal ulcer.
      3 - Lid lengthening procedure.
      4 - Tarsorrhaphy.
      5 - Systemic steroids.
      6 - Radiotherapy of the orbit.
      7 - decompression.
      8 - Prisms / occlusion.
      9 - Muscle surgery.

Did the patient undergone Orbital
Decompression (Y/N) ?
```

```
(Y..!..N or an option)  n
```

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient have previously used
prisms / occlusion (Y/N) ?

(Y..!..N or an option) n

Previous eye treatment:

1 - Eye lubricants.
2 - Treatment for corneal ulcer.
3 - Lid lengthening procedure.
4 - Tarsorrhaphy.
5 - Systemic steroids.
6 - Radiotherapy of the orbit.
7 - decompression.
8 - Prisms / occlusion.
9 - Muscle surgery.

Did the patient have extra ocular Muscle surgery (Y/N)?

(Y..!..N or an option)

In your view, how bad is the effect of the eye condition on the patient's appearance ?

(On a scale from 1 to 10)
1 .... normal
10 .... abnormal

(1 to10, ! if not known or an option) 4

How does the patient describe
his diplopia ?

(1) No diplopia.

(2) Mild (or only in extreme gaze).
(3) Moderate.

(4) Severe (close to mid line)

(1 to4, ! if not known or an option) 1

On examination of the ocular motility
Diplopia is:

(1) Absent.

(2) In extreme gaze.

(3) On elevation/depression.
(4) On adduction/abduction.

(5) Close to midline.

(1 to5, ! if not known or an option) 3

Enter Exophthalmometry reading in mm.

(Make a note of the base reading if using Hertel or Keeler - Please use the same base for all subsequent measures)

(12 to40, ! if not known or an option) 25

Considering:

- patient race,
- facial configuration and
- errors of refraction (high myopes)

Do you regard Exophalmometric reading

(1) Normal,

(2) Equivocal or

(3) Abnormal ?

(1 to3, ! if not known or an option) 3

What is the best corrected Visual Acuity ?

1 - 6 /5	
2 - 6 /6	9 - 5 /60
3 - 6 /9	10 - 4 /60
4 - 6 /12	11 - 3 /60
5 - 6 /18	12 - 2 /60
6 - 6 /24	13 - 1 /60
7 - 6 /36	
8 - 6 /60	

14 - Counting fingures
15 - Hand movement (H.M.)
16 - Perception of light (P.L.)
17 - No Perception of light (N.P.L.)

(1 to17, ! if not known or an option) 2

Is there any Right Lid Lag ?

(Y or N or an option) y

Right Eye Lid:

(1) Normal.

(2) Mild retraction.
(3) Moderate retraction.

(4) Severe retraction.

(1 to4, ! if not known or an option) 2

Right Eye Lid :

(1) No lid oedema .

(2) Mild lid oedema .
(3) Moderate lid oedema .

(4) Severe lid oedema .

(1 to4, ! if not known or an option) 2

Right Conjunctiva

(1) No chemosis.

(2) Mild chemosis.
(3) Moderate chemosis.

(4) Severe chemosis.

(1 to4, ! if not known or an option) 2

Right Cornea:

(1) Clear.

(2) Stippling.

(3) Ulcer.

(4) Necrosis/Perforation.

(5) Scarring.

(1 to5, ! if not known or an option) 2

Enter Interocular straight pressure

(10 to50, ! if not known or an option) 18

Enter Interocular pressure in up gaze

(10 to50, ! if not known or an option) 24

Pupillary reaction :

1 - Normal.

2 - Afferent pupillary defect.

(1 to2, ! if not known or an option) 1

Right Fundus:

On Ophthalmoscopy

Can you detect any choroidal folds ?

(Y or N or an option) n

Right Optic Disc

On Ophthalmoscopy

(1) No papilloedema.

(2) Suspected disc oedema.

(3) Definite disc oedema.

(1 to3, ! if not known or an option) 1

The Report is:-

Optic Nerve:

From the clinical data there is no evidence to suggest optic nerve compression.

Normally no further investigations of the visual functions are required. However, it is recommended to proceed with baseline tests for future reference.

Cornea:

Normal cornea.

Right Eyelid:

F)orwards or S)top [F,S]

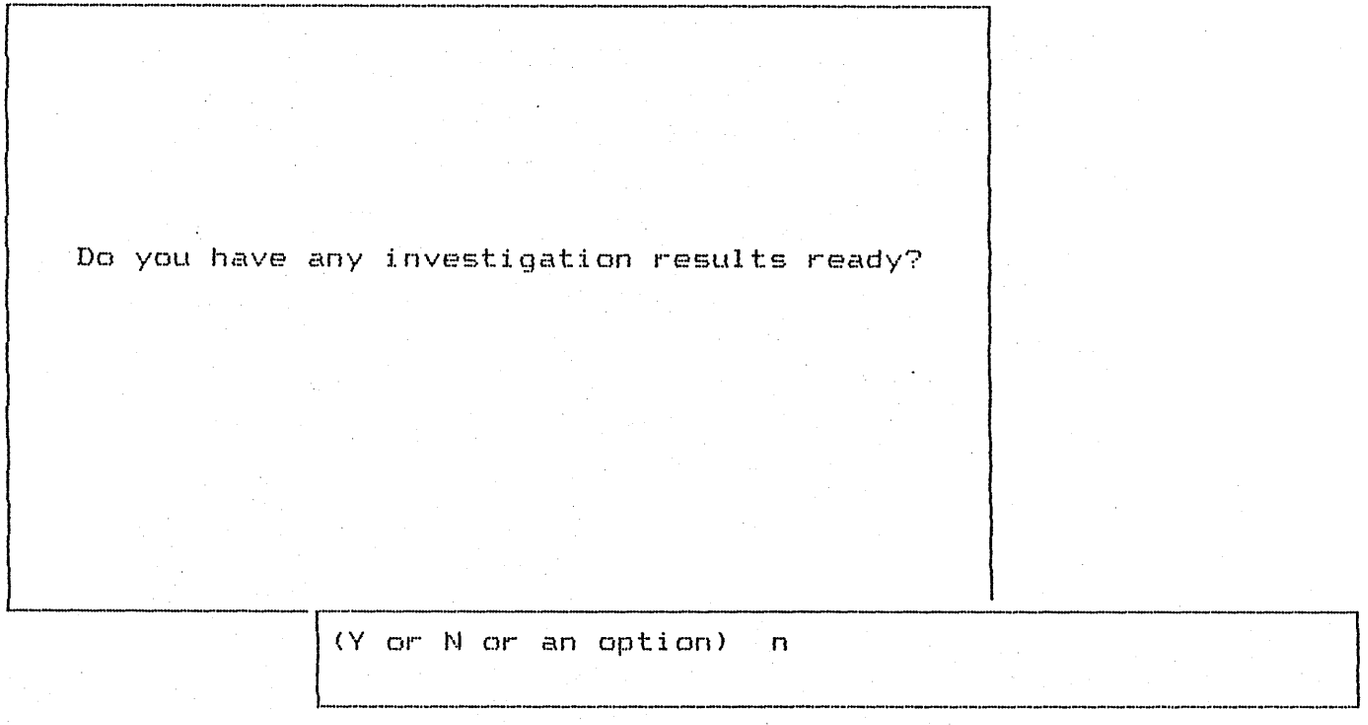
Only lid retraction (and/or) lidlag. No coverage problem.

Extraocular Muscles:

The clinical data provides a conclusive evidence of extraocular muscles dysfunction.

The following investigations are required: Hess chart, Field of single binocular vision.

B)ackwards or S)top [B,S]


Do you have any investigation results ready?
(Y or N or an option) n

Now ..

The clinical data enquiry is completed and no investigation results are available

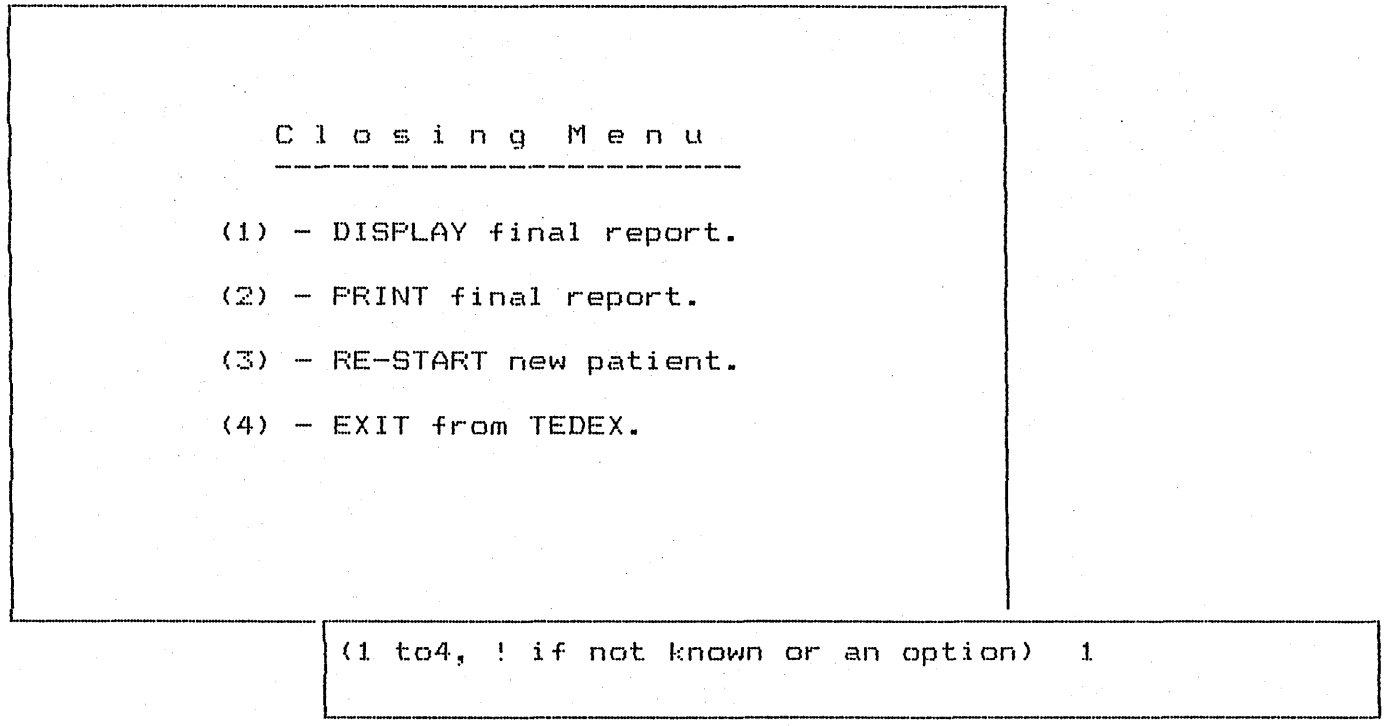
Do you want to:

(1) Stop at this stage untill you get the investigation results.

OR

(2) Continue without investigations.

(1 to2 or an option) 2


C l o s i n g M e n u
(1) - DISPLAY final report.
(2) - PRINT final report.
(3) - RE-START new patient.
(4) - EXIT from TEDEX.
(1 to4, ! if not known or an option) 1

The Report is:-

TEDEX FINAL REPORT

```
**************************************************************************
*                                                                        *
* TEDEX  is  an experimental expert     thyroid eye disease.             *
* system  which  provides  an extra     The clinician involved must  still *
* piece  of  information  about the     make the final decision, and must  *
* assesment    and   management  of     carry  the responsibility of that  *
* patients    suffering  from  dys-     decision.                          *
*                                                                        *
**************************************************************************
```

Examiner: Dr.ZEINI (Registrar)

Hospital No. : 000000074

F)orwards or S)top [F,S]

Name : 074
Sex : F
Year of Birth: 20 (69 years old)

History:

The patient is complaining
mainly of:

- lacrimation
- photophobia

for 1 months.

Relevant present and past history:

* The following treatment recieved
for the occular condition:
B)ackwards, F)orwards or S)top [B,F,S]

- Eye lubricants (This proved to be successful)

* Diagnosis of Hypothyroid has been made
  48 months ago.

* Thyroid dysfunction treated by:
  - Carbimazol

Clinical findings :	Right eye	Left eye
Snellens acuity	- 6/6	- .....
Lid retraction	- Yes	- .....
Lid lag	- YES	- .....

Soft-tissues changes:

B)ackwards, F)orwards or S)top [B,F,S]

Lid eodema	- Mild	- .....
Chemosis	- Mild	- .....
Cornea	- S.P.K	- .....
Pupillary reactions	- Normal	- .....

Ophthalmoscopy

- No oedema	- .....
- Afferent defect	- .....

Intraocular Pressure:

Straight	- 18	- .....
In up gaze	- 24	- .....
Delta I.O.P	- -6	- .....
Exophalmometrty	- 25	- .....

B)ackwards, F)orwards or S)top [B,F,S]

Extra-ocular motility: On adduction/abduction

Effect of the eye problem on the
patient's appearance:

Results of the most recent investigations

VISUSL FUNCTIONS:

Field of vision :	- No data	-
Colour vision :	- No data	-
(100-Hue score)		

B)ackwards, F)orwards or S)top [B,F,S]

From the clinical data there is no evidence to suggest optic nerve compression.

Cornea:

Normal cornea.

Right Eyelid:

Only lid retraction (and/or) lidlag. No coverage problem.

Extraocular Muscles:

The clinical data provides a conclusive evidence of extraocular muscles dysfunction.

B)ackwards, F)orwards or S)top [B,F,S]

ORBITAL IMAGING:

Ultrasound:	- No data	- .....
C.T.scan:	- No data	- .....
M.R.I.scan:	- No data	-.....

Thyroid Biochemistry:

Serum T3:	- Unknowable
Serum T4:	- Unknowable
T.S.H:	- Unknowable

Optic Nerve:

B)ackwards, F)orwards or S)top [B,F,S]

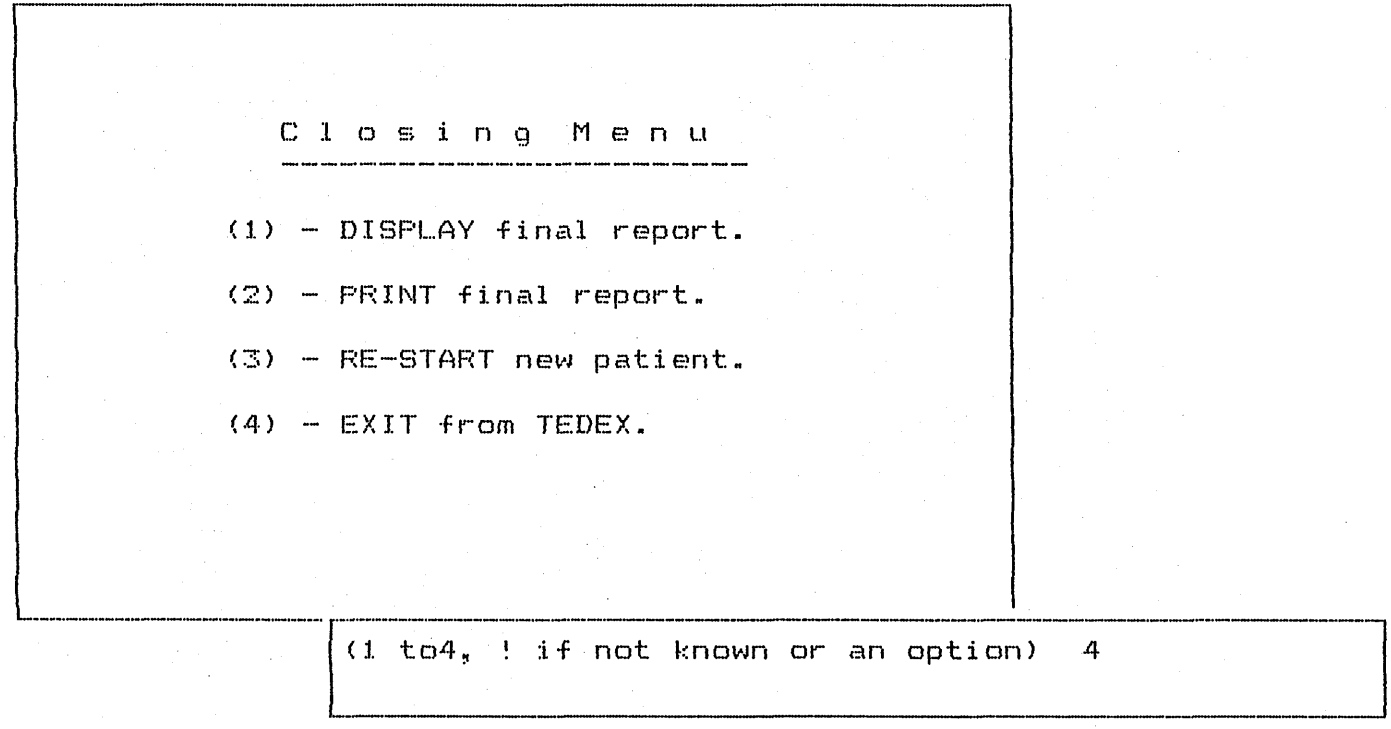
ACTION (70) Next appointment

One month.

RECOMENDED TREATMENT

No treatment is required for the ocular motility disturbance at this stage.

B)ackwards or S)top [B,S]


C l o s i n g M e n u
(1) - DISPLAY final report.
(2) - PRINT final report.
(3) - RE-START new patient.
(4) - EXIT from TEDEX.
(1 to4, ! if not known or an option) 4

Appendix D4 - Validation results print out

No	Name	Condition		Value		
Variable(s)						
29	f a p patient appearance	Ans	True	Ans	0.5000	0.5000
0.5000						
197	p diplopia symptom now	Ans	True	Not Ans	0.1000	0.9688
0.0313						
198	p diplopia symptom change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455						
199	p diplopia on examination now	Ans	True	Not Ans	0.1000	1.0000
0.0455						
202	p proptosis now	Ans	True	Not Ans	0.1000	0.9545
0.0455						
203	p proptosis change	Not Ans	Unknown	Not Ans	0.1000	0.9901
0.0000						
204	p snellen now	Ans	True	Not Ans	0.0500	0.9924
0.0000						
205	p snellen change	Not Ans	Unknown	Not Ans	0.0500	0.9804
0.0000						
206	p lid lag	Ans	True	Not Ans	0.1000	1.0000
0.0000						
207	p lid retraction	Ans	True	Not Ans	0.1000	0.9688
0.0313						
208	p lid eodema now	Ans	True	Not Ans	0.1000	0.8857
0.0286						
209	p lid eodema change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455						
210	p chemosis now	Ans	True	Not Ans	0.1000	0.8857
0.0286						
211	p chemosis change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455						
212	p cornea now	Ans	True	Not Ans	0.1000	0.9762
0.0238						
213	p cornea change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455						
217	p disk eodima	Not Ans	Unknown	Not Ans	0.2000	0.8780
0.2060						
223	p test mal nerve	Ans	True	Ans	0.2000	0.2000
0.2000						
230	p test mal muscles	Ans	True	Ans	0.1000	0.1000
0.1000						
247	p sug mal nerve	Ans	True	Not Ans	0.2000	0.9183
0.2060						
252	p sug mal muscles	Ans	True	Not Ans	0.1000	0.9656
0.1000						
259	p mal nerve	Ans	True	Not Ans	0.2000	0.9183
0.2060						
260	p visual acuity drop	Not Ans	Unknown	Not Ans	0.2000	0.9183
0.2000						
261	p field of vision	Not Ans	False	Ans	0.2000	0.2000
0.2000						
262	p 100 hue test	Not Ans	False	Ans	0.2000	0.2000
0.2000						
263	p1 disk eodima	Ans	True	Not Ans	0.0350	0.9545
0.0455						
265	p1 visual acuity drop	Ans	True	Not Ans	0.0500	0.9998
0.0500						
266	p snellen acuity drop	Ans	True	Not Ans	0.0500	0.9998
0.0500						
268	p1 snellen change	Ans	True	Not Ans	0.0500	0.9804
0.0000						
270	p vision dummy	Ans	True	Ans	0.8000	0.8000
0.8000						

271 p field now	Ans	True	Not Ans	0.0200	0.9688
0.0313					
272 P field change	Not Ans	Unknown	Not Ans	0.0200	0.9688
0.0000					
273 p1 field change	Ans	True	Not Ans	0.0200	0.9688
0.0000					
275 p 100 hue now	Ans	True	Not Ans	0.1000	1.0000
0.0000					
276 P 100 hue change	Not Ans	Unknown	Not Ans	0.1000	1.0000
0.0000					
277 p1 100 hue change	Ans	True	Not Ans	0.1000	1.0000
0.0000					
280 p mal muscles	Ans	True	Not Ans	0.1000	0.9656
0.1000					
281 p diplopia	Ans	True	Not Ans	0.1000	0.9656
0.1000					
282 p proptosis	Ans	True	Not Ans	0.1000	0.9648
0.1000					
283 p Hess chart	Not Ans	False	Ans	0.1000	0.1000
0.1000					
284 p ultra sound	Not Ans	False	Ans	0.1000	0.1000
0.1000					
285 p CTscan	Not Ans	False	Ans	0.1000	0.1000
0.1000					
286 p MRIscan	Not Ans	False	Ans	0.1000	0.1000
0.1000					
287 p diplopia symptom	Ans	True	Not Ans	0.1000	0.9628
0.1000					
288 p diplopia on examination	Ans	True	Not Ans	0.1000	0.9656
0.1000					
290 p1 diplopia symptom change	Ans	True	Not Ans	0.1000	0.9545
0.0455					
292 p diplopia on examination change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455					
295 p1 diplopia on examination change	Ans	True	Not Ans	0.1000	0.9545
0.0455					
299 p1 proptosis change	Ans	True	Not Ans	0.1000	0.9901
0.0000					
301 p Hess chart now	Ans	True	Not Ans	0.1000	0.9878
0.0122					
302 p Hess chart change	Not Ans	Unknown	Not Ans	0.1000	0.9545
0.0455					
303 p hess dummy	Ans	True	Ans	0.9000	0.9000
0.9000					
304 p1 Hess chart change	Ans	True	Not Ans	0.1000	0.9545
0.0455					
306 p mal lid	Ans	True	Not Ans	0.1000	0.5064
0.0217					
307 p uncoverage	Ans	True	Not Ans	0.1000	0.9688
0.0000					
310 p mal cornea	Ans	True	Not Ans	0.1000	0.9961
0.1000					
311 p cornea	Ans	True	Not Ans	0.1000	0.9961
0.1000					
313 p1 cornea change	Ans	True	Not Ans	0.1000	0.9545
0.0455					
316 p lid eodema	Ans	True	Not Ans	0.1000	0.9545
0.1000					
317 p chemosis	Ans	True	Not Ans	0.1000	0.9545
0.1000					
319 p1 lid eodema change	Ans	True	Not Ans	0.1000	0.9545
0.0455					
322 p1 chemosis change	Ans	True	Not Ans	0.1000	0.9545
0.0455					

```
  19 f a i thyroid status                          Ans    True       Ans   Unknown
  28 f a i patient most troublesome                Ans    True       Ans   Unknown
  30 f a i eye disease duration                    Ans    True       Ans   Unknown
  40 f a i disk eodema                             Ans    True       Ans   Unknown
  42 f a i snellen now                             Ans    True       Ans   Unknown
  43 f a i field now                               Ans    True       Ans   Unknown
  44 f a i 100 hue now                             Ans    True       Ans   Unknown
  46 f a i diplopia symptom now                    Ans    True       Ans   Unknown
  47 f a i diplopia on examination now             Ans    True       Ans   Unknown
  48 f a i proptosis opinion                       Ans    True       Ans   Unknown
  49 f a i proptosis now                           Ans    True       Ans   Unknown
  50 f a i Hess chart now                          Ans    True       Ans   Unknown
  51 f a i ultra sound                             Ans    True       Ans   Unknown
  53 f a i lid retraction                          Ans    True       Ans   Unknown
  54 f a i cornea now                              Ans    True       Ans   Unknown
  55 f a i lid eodema now                          Ans    True       Ans   Unknown
  56 f a i chemosis now                            Ans    True       Ans   Unknown
  57 f n IOP dif                                   Ans    True       Ans   Unknown
  58 f m i nerve condition                         Ans    True       Ans   Unknown
  59 f m i muscles condition                       Ans    True       Ans   Unknown
  60 f m i cornea condition                        Ans    True       Ans   Unknown
  61 f m i lid condition                           Ans    True       Ans   Unknown
  62 m i nerve condition                           Ans    True       Ans   Unknown
  63 m i muscles condition                         Ans    True       Ans   Unknown
  64 m i cornea condition                          Ans    True       Ans   Unknown
  65 m i lid condition                             Ans    True       Ans   Unknown
  74 f m i action                                  Ans    True       Ans   Unknown
  75 m i action                                    Ans    True       Ans   Unknown
 192 m a i user experience                         Ans    True       Ans   Unknown
 193 f a i user experience                         Ans    True       Ans   Unknown
 214 n IOP dif                                     Ans    True   Not Ans     40.00
40.00
 219 i stop cont?                          Not Ans   False       Ans       2.00
2.00
 335 nnnn                                      Ans Unknown       Ans   Unknown
 336 n sug mal nerve                           Ans    True   Not Ans       0.92
0.21
 337 n test mal nerve                          Ans    True       Ans       0.20
0.20
 338 i validate nerve answers              Not Ans   False       Ans       4.00
4.00
 345 cccc                                      Ans Unknown       Ans   Unknown
 347 cccc converted                    Not Ans Unknown   Not Ans       4.00
1.00
 348 cccc converted a                  Not Ans Unknown   Not Ans       3.00
1.00
 349 cccc converted b                  Not Ans Unknown   Not Ans       2.00
1.00
 350 cccc converted c                  Not Ans Unknown   Not Ans       1.00
1.00
 352 nnnn converted                    Not Ans Unknown   Not Ans       4.00
1.00
 353 nnnn converted a                  Not Ans Unknown   Not Ans       3.00
1.00
 354 nnnn converted b                  Not Ans Unknown   Not Ans       2.00
1.00
 355 nnnn converted c                  Not Ans Unknown   Not Ans       1.00
1.00
 356 1111                                      Ans Unknown       Ans   Unknown
 358 1111 converted                    Not Ans   False   Not Ans       3.00
1.00
 359 1111 converted a                  Not Ans Unknown   Not Ans       3.00
1.00
 360 1111 converted b                  Not Ans Unknown   Not Ans       2.00
1.00
```

```
361 1111 converted c                    Not Ans Unknown  Not Ans      1.00
1.00
362 mmmm                                    Ans Unknown      Ans   Unknown
364 mmmm converted                      Not Ans Unknown  Not Ans      4.00
1.00
365 mmmm converted a                    Not Ans Unknown  Not Ans      3.00
1.00
366 mmmm converted b                    Not Ans Unknown  Not Ans      2.00
1.00
367 mmmm converted c                    Not Ans Unknown  Not Ans      1.00
1.00
368 prop                                    Ans Unknown      Ans   Unknown
370 prop converted                      Not Ans Unknown  Not Ans      3.00
1.00
371 prop converted a                    Not Ans Unknown  Not Ans      2.00
1.00
372 prop converted b                    Not Ans Unknown  Not Ans      1.00
1.00
377 i choose action 1                       Ans Unknown      Ans   Unknown
378 i choose action 2                       Ans Unknown      Ans   Unknown
379 i choose action 3                       Ans Unknown      Ans   Unknown
380 i choose action 4                       Ans Unknown      Ans   Unknown
381 i choose action 5                       Ans Unknown      Ans   Unknown
382 i choose action 6                       Ans Unknown      Ans   Unknown
383 i choose action 7                       Ans Unknown      Ans   Unknown
384 i choose action 8                       Ans Unknown      Ans   Unknown
632 n sug mal muscles                       Ans    True  Not Ans      0.97
0.10
633 n test mal muscles                      Ans    True      Ans      0.10
0.10
634 i validate muscles answers          Not Ans   False      Ans      4.00
4.00

 10 f a c Diabetic?                         Ans    True      Ans Unknown
 11 f a c Hypertensive?                     Ans    True      Ans Unknown
 12 f a c Renal?                            Ans    True      Ans Unknown
 13 f a c Pulmonaric?                       Ans    True      Ans Unknown
 14 f a c GI?                               Ans    True      Ans Unknown
 15 f a c peptic ulceration                 Ans    True      Ans Unknown
 16 f a c history anti steroids             Ans    True      Ans Unknown
 17 f a c contra anasthesia?                Ans    True      Ans Unknown
 18 f a c Hart disease                      Ans    True      Ans Unknown
 20 f a c Radioactive iodine?               Ans    True      Ans Unknown
 21 f a c Thyroidectomy?                    Ans    True      Ans Unknown
 22 f a c Carbimazol?                       Ans    True      Ans Unknown
 23 f a c lacrimination?                    Ans    True      Ans Unknown
 24 f a c photophobia?                      Ans    True      Ans Unknown
 25 f a c visual blurring?                  Ans    True      Ans Unknown
 26 f a c double vision?                    Ans    True      Ans Unknown
 27 f a c pain?                             Ans    True      Ans Unknown
 31 f a c Eye lubricants?                   Ans    True      Ans Unknown
 32 f a c Tr for corneal ulcer?             Ans    True      Ans Unknown
 33 f a c Lid lengthening?                  Ans    True      Ans Unknown
 34 f a c Tarsorhaphy?                      Ans    True      Ans Unknown
 35 f a c Systemic steroids?                Ans    True      Ans Unknown
 36 f a c Radiotherapy?                     Ans    True      Ans Unknown
 37 f a c decompression?                    Ans    True      Ans Unknown
 38 f a c Prisms occlusion?                 Ans    True      Ans Unknown
 39 f a c Muscle surgery?                   Ans    True      Ans Unknown
 41 f a c coroidal folds                    Ans    True      Ans Unknown
 45 f a c color blind                       Ans    True      Ans Unknown
 52 f a c lid lag                           Ans    True      Ans Unknown
 66 f m c field of vision                   Ans    True      Ans Unknown
 67 f m c 100 hue test                      Ans    True      Ans Unknown
 68 f m c Hess chart                        Ans    True      Ans Unknown
```

69	f m c ultra sound		Ans	True		Ans	Unknown
70	m c field of vision		Ans	True		Ans	Unknown
71	m c 100 hue test		Ans	True		Ans	Unknown
72	m c Hess chart		Ans	True		Ans	Unknown
73	m c ultra sound		Ans	True		Ans	Unknown
76	f m c eye lubricants		Ans	True		Ans	Unknown
77	f m c systemic steroids		Ans	True		Ans	Unknown
78	f m c raise head w dioretics		Ans	True		Ans	Unknown
79	f m c raise head w no dioretics		Ans	True		Ans	Unknown
80	f m c occlusion or prism		Ans	True		Ans	Unknown
81	f m c Radiotherapy		Ans	True		Ans	Unknown
82	f m c anti glaucoma medications		Ans	True		Ans	Unknown
83	m c eye lubricants		Ans	True		Ans	Unknown
84	m c systemic steroids		Ans	True		Ans	Unknown
85	m c raise head w dioretics		Ans	True		Ans	Unknown
86	m c raise head w no dioretics		Ans	True		Ans	Unknown
87	m c occlusion or prism		Ans	True		Ans	Unknown
88	m c Radiotherapy		Ans	True		Ans	Unknown
89	m c anti glaucoma medications		Ans	True		Ans	Unknown
90	f m c tarsoraphy		Ans	True		Ans	Unknown
91	f m c lid lenghthen		Ans	True		Ans	Unknown
92	f m c decompression		Ans	True		Ans	Unknown
93	f m c muscles surgery		Ans	True		Ans	Unknown
94	m c tarsoraphy		Ans	True		Ans	Unknown
95	m c lid lenghthen		Ans	True		Ans	Unknown
96	m c decompression		Ans	True		Ans	Unknown
97	m c muscles surgery		Ans	True		Ans	Unknown
99	please load		Ans	True		Ans	Unknown
178	last visit report		Ans	True		Ans	Unknown
179	please get		Ans	True		Ans	Unknown
180	please obtain		Ans	True		Ans	Unknown
181	a begin		Ans	True		Ans	Unknown
182	b begin		Ans	True		Ans	Unknown
183	c begin		Ans	True		Ans	Unknown
184	clinical finished		Ans	True		Ans	Unknown
185	first report		Ans	True		Ans	Unknown
186	validate finished		Ans	True		Ans	Unknown
187	please save		Ans	True		Ans	Unknown
188	please sheel		Ans	True		Ans	Unknown
189	please store		Ans	True		Ans	Unknown
195	z begin		Ans	True		Ans	Unknown
216	c coroidal folds		Ans	True	Not	Ans	Unknown
220	c nerve invest?	Not	Ans	False		Ans	False
221	c field of vision?		Ans	False		Ans	False
222	c 100 hue?		Ans	False		Ans	False
225	c muscles invest?	Not	Ans	False		Ans	False
226	c Hess chart?	Not	Ans	False		Ans	False
227	c ultra sound?	Not	Ans	False		Ans	False
228	c CTscan?	Not	Ans	False		Ans	False
229	c MRIscan?	Not	Ans	False		Ans	False
250	c nerve sug test dif		Ans	True	Not	Ans	Unknown
257	c muscles sug test dif		Ans	True	Not	Ans	Unknown
294	c six month stable diplopia	Not	Ans	Unknown	Not	Ans	Unknown
327	c show final menu		Ans	True	Not	Ans	Unknown
375	c announce action		Ans	True		Ans	Unknown
376	c start treatment		Ans	Unknown		Ans	Unknown
396	c no ulcer		Ans	Unknown		Ans	Unknown
398	c tr ulcer		Ans	True		Ans	Unknown
400	c tr ulcer lubrication		Ans	True		Ans	Unknown
402	c tr ulc nerv w steroids		Ans	True	Not	Ans	Unknown
403	anti steroids		Ans	True	Not	Ans	Unknown
405	c tr ulc nerv w radiotherapy		Ans	True	Not	Ans	Unknown
406	anti radio		Ans	True	Not	Ans	Unknown

```
 408 c tr ulc nerv critical                Ans    True  Not Ans Unknown
 414 anti surgery                          Ans    True  Not Ans Unknown
 417 c TEDEX choice                Not Ans Unknown  Not Ans Unknown
 419 c1 TEDEX choice               Not Ans Unknown  Not Ans Unknown
 421 c2 TEDEX choice               Not Ans Unknown  Not Ans Unknown
 438 c tr nerve w steroids                 Ans    True  Not Ans Unknown
 440 c tr nerve w decompression            Ans    True  Not Ans Unknown
 442 c tr nerve w radiotherapy             Ans    True  Not Ans Unknown
 443 c start treating lid                  Ans    True  Not Ans Unknown
 444 c do not decompress                   Ans    True  Not Ans Unknown
 461 c tr lid drcompress                   Ans    True  Not Ans Unknown
 463 c tr lid lengthening                  Ans    True  Not Ans Unknown
 465 c tr tarsoraphy                       Ans    True  Not Ans Unknown
 467 c postpone lid tr                     Ans    True  Not Ans Unknown
 469 c tr cornea lid lubrication           Ans    True      Ans Unknown
 471 c start treating muscles              Ans    True  Not Ans Unknown
 472 c stable                              Ans    True      Ans   False
 474 c muscles troubles                    Ans    True  Not Ans Unknown
 475 c any other troubles                  Ans    True  Not Ans Unknown
 476 c coping                              Ans    True  Not Ans Unknown
 478 c postpone muscles surgery            Ans    True  Not Ans Unknown
 479 c do not decomp muscles               Ans    True      Ans   False
 481 c do deco first muscles               Ans    True      Ans   False
 483 c do muscles surgery                  Ans    True      Ans   False
 485 c do muscles surgery w care           Ans    True      Ans   False
 488 c prism or occlussion                 Ans    True      Ans   False
 490 c do nothing for muscles              Ans    True      Ans   False
 542 c more than 2 symtoms                 Ans    True  Not Ans Unknown
 606 c anti steroids                       Ans    True  Not Ans Unknown
 616 c anti surgery                        Ans    True  Not Ans Unknown
 620 c anti radio                          Ans    True  Not Ans Unknown

   7 f a s patient name                    Ans    True      Ans Unknown
   8 f a s patient DOB                     Ans    True      Ans Unknown
   9 f a s patient sex                     Ans    True      Ans Unknown
 190 f a s who are you                     Ans    True      Ans Unknown
 191 m a s who are you                     Ans    True      Ans Unknown
 343 s already said                        Ans    True      Ans Unknown
 344 s lid already said                    Ans    True      Ans Unknown
 409 s proptosis                           Ans Unknown      Ans Unknown
 410 s1 proptosis                          Ans Unknown      Ans Unknown
 411 s2 proptosis                          Ans Unknown      Ans Unknown
 412 s anti steroids               Not Ans   False        Ans
 413 s anti surgery                Not Ans   False        Ans
 415 s anti radio                  Not Ans   False        Ans
 416 s TEDEX choice                Not Ans   False        Ans Unknown
 418 s1 TEDEX choice               Not Ans   False        Ans Unknown
 420 s2 TEDEX choice               Not Ans   False        Ans Unknown
 422 s choose steroids             Not Ans   False        Ans Enter 1 s
.for steroi...
 423 s choose decompression        Not Ans   False        Ans Enter 2 d
.for decomp...
 424 s choose radiotherapy         Not Ans   False        Ans Enter 3 r
.for radiot...
 429 s contra indications          Not Ans   False        Ans Unknown
 430 s1 contra indications         Not Ans   False        Ans Unknown
 431 s2 contra indications         Not Ans   False        Ans Unknown
 433 s critical choice             Not Ans Unknown  Not Ans Unknown
 434 s1 critical choice            Not Ans Unknown  Not Ans Unknown
 445 s lid condition                   Ans Unknown      Ans Unknown
 446 s1 lid condition                  Ans Unknown      Ans Unknown
 447 s lid A TEDEX choice          Not Ans    True        Ans Surgical
```

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pression
 448 s1 lid A TEDEX choice                Not Ans Unknown  Not Ans Unknown
 449 s2 lid A TEDEX choice                Not Ans Unknown  Not Ans Unknown
 450 s lid choose decomp                  Not Ans   False      Ans Enter 3 d
or decompre...
 456 s lid B TEDEX choice                     Ans Unknown      Ans Unknown
 457 s1 lid B TEDEX choice                    Ans Unknown      Ans Unknown
 496 s user experience                        Ans Unknown      Ans Unknown
 497 s lacrimination                      Not Ans   False      Ans
 498 s photophobia                        Not Ans   False      Ans
 499 s blurring                           Not Ans   False      Ans
 500 s double vision                      Not Ans   False      Ans
 501 s pain                               Not Ans   False      Ans
 503 s Eye lubricants?                    Not Ans   False      Ans
 504 s Tr f cr ulcer?                     Not Ans   False      Ans
 505 s Lid lengthening?                   Not Ans   False      Ans
 506 s Tarsoraphy?                        Not Ans   False      Ans
 507 s Systemic steroids?                 Not Ans   False      Ans
 508 s steroids effect                    Not Ans   False      Ans
 509 s Radiotherapy?                      Not Ans   False      Ans
 510 s Radiotherapy effect                Not Ans   False      Ans
 511 s decompression?                     Not Ans   False      Ans
 512 s decompression effect               Not Ans   False      Ans
 513 s Prisms occlussion?                 Not Ans   False      Ans
 514 s Muscle surgery?                    Not Ans   False      Ans
 515 s thyroid status                     Not Ans   False      Ans Unknown
 516 s Radioactive iodine                 Not Ans   False      Ans
 517 s Thyroidectomy                      Not Ans   False      Ans
 518 s Carbimazol                         Not Ans   False      Ans
 519 s T3                                 Not Ans   False      Ans
 520 s T4                                 Not Ans   False      Ans
 521 s snellen now                        Not Ans   False      Ans Unknown
 522 s lid retract                        Not Ans   False      Ans Unknown
 523 s lid lag                            Not Ans   False      Ans Unknown
 524 s lid eodema                         Not Ans   False      Ans Unknown
 525 s chemosis                           Not Ans   False      Ans Unknown
 526 s cornea                             Not Ans   False      Ans Unknown
 527 s pupill                             Not Ans   False      Ans Unknown
 529 s disk eodema                        Not Ans   False      Ans Unknown
 530 s coroidal fld                       Not Ans   False      Ans Unknown
 531 s diplopia on examination            Not Ans   False      Ans Unknown
 532 s cosmetic appearance                Not Ans   False      Ans Unknown
 533 s field                              Not Ans   False      Ans No data
 534 s ultra sound                        Not Ans   False      Ans No data
 535 s CTscan                             Not Ans   False      Ans No data
 536 s MRIscan                            Not Ans   False      Ans No data
 537 s1 user experience                       Ans Unknown      Ans Unknown
 538 s2 user experience                       Ans Unknown      Ans Unknown
 539 s3 user experience                       Ans Unknown      Ans Unknown
 540 s4 user experience                       Ans Unknown      Ans Unknown
 541 s5 user experience                       Ans Unknown      Ans Unknown
 543 s1 steroids effect                   Not Ans   False      Ans
 544 s2 steroids effect                   Not Ans   False      Ans
 545 s1 Radiotherapy effect               Not Ans   False      Ans
 546 s2 Radiotherapy effect               Not Ans   False      Ans
 547 s1 decompression effect              Not Ans   False      Ans
 548 s2 decompression effect              Not Ans   False      Ans
 549 s1 thyroid status                    Not Ans   False      Ans Unknown
 550 s2 thyroid status                    Not Ans   False      Ans Unknown
 551 s1 snellen now                       Not Ans   False      Ans Unknown
 552 s2 snellen now                       Not Ans   False      Ans Unknown
 553 s3 snellen now                       Not Ans   False      Ans Unknown
 554 s4 snellen now                       Not Ans   False      Ans Unknown
 555 s5 snellen now                       Not Ans   False      Ans Unknown
```

556 s6 snellen now	Not Ans	False	Ans Unknown
557 s7 snellen now	Not Ans	False	Ans Unknown
558 s8 snellen now	Not Ans	False	Ans Unknown
559 s9 snellen now	Not Ans	False	Ans Unknown
560 s10 snellen now	Not Ans	False	Ans Unknown
561 s11 snellen now	Not Ans	False	Ans Unknown
562 s12 snellen now	Not Ans	False	Ans Unknown
563 s13 snellen now	Not Ans	False	Ans Unknown
564 s14 snellen now	Not Ans	False	Ans Unknown
565 s15 snellen now	Not Ans	False	Ans Unknown
566 s16 snellen now	Not Ans	False	Ans Unknown
567 s1 lid retract	Not Ans	False	Ans Unknown
568 s2 lid retract	Not Ans	False	Ans Unknown
569 s3 lid retract	Not Ans	False	Ans Unknown
570 s1 lid lag	Not Ans	False	Ans Unknown
571 s1 lid eodema	Not Ans	False	Ans Unknown
572 s2 lid eodema	Not Ans	False	Ans Unknown
573 s3 lid eodema	Not Ans	False	Ans Unknown
574 s1 chemosis	Not Ans	False	Ans Unknown
575 s2 chemosis	Not Ans	False	Ans Unknown
576 s3 chemosis	Not Ans	False	Ans Unknown
577 s1 cornea	Not Ans	False	Ans Unknown
578 s2 cornea	Not Ans	False	Ans Unknown
579 s3 cornea	Not Ans	False	Ans Unknown
580 s4 cornea	Not Ans	False	Ans Unknown
581 s1 pupill	Not Ans	False	Ans Unknown
582 s1 disk eodema	Not Ans	False	Ans Unknown
583 s2 disk eodema	Not Ans	False	Ans Unknown
584 s1 coroidal fld	Not Ans	False	Ans Unknown
585 s1 diplopia on examination	Not Ans	False	Ans Unknown
586 s2 diplopia on examination	Not Ans	False	Ans Unknown
587 s3 diplopia on examination	Not Ans	False	Ans Unknown
588 s4 diplopia on examination	Not Ans	False	Ans Unknown
589 s1 field	Not Ans	False	Ans No data
590 s2 field	Not Ans	False	Ans No data
591 s3 field	Not Ans	False	Ans No data
592 s1 ultra sound	Not Ans	False	Ans No data
593 s2 ultra sound	Not Ans	False	Ans No data
594 s3 ultra sound	Not Ans	False	Ans No data
595 s4 ultra sound	Not Ans	False	Ans No data
596 s1 CTscan	Not Ans	False	Ans No data
597 s2 CTscan	Not Ans	False	Ans No data
598 s3 CTscan	Not Ans	False	Ans No data
599 s4 CTscan	Not Ans	False	Ans No data
600 s1 MRIscan	Not Ans	False	Ans No data
601 s2 MRIscan	Not Ans	False	Ans No data
602 s3 MRIscan	Not Ans	False	Ans No data
603 s4 MRIscan	Not Ans	False	Ans No data
609 s Diabetic	Not Ans	False	Ans
610 s Hyper tensive	Not Ans	False	Ans
611 s female over45	Not Ans	False	Ans
612 s steroids side effect	Not Ans	False	Ans
613 s peptic ulceration	Not Ans	False	Ans

Question(s)

141 a p patient appearance	Ans	True	Not Ans	0.0100	1.0000
0.0000					
115 a i novice user intro	Ans	True	Not Ans	6.00	
0.00					
126 a i user experience	Ans	True	Not Ans	7.00	
1.00					
131 a i patient age	Ans	True	Not Ans	90.00	
1.00					

134 a i patient most troublesome	Ans	True	Not Ans	4.00	1.00
135 a i eye disease duration	Ans	True	Not Ans	120.00	1.00
136 a i thyroid status	Ans	True	Not Ans	3.00	1.00
137 a i thyroid disease duration	Ans	True	Not Ans	300.00	1.00
158 a i T3	Ans	True	Not Ans	50.00	1.00
159 a i T4	Ans	True	Not Ans	50.00	1.00
160 a i TSH	Ans	True	Not Ans	50.00	1.00
166 a i Sys steroids effect?	Not Ans	Unknown	Not Ans	3.00	0.00
168 a i Radiotherapy effect?	Not Ans	Unknown	Not Ans	3.00	0.00
170 a i decompression effect?	Not Ans	Unknown	Not Ans	3.00	0.00
173 a i main menu	Ans	True	Not Ans	4.00	1.00
174 a i teaching menu	Ans	True	Not Ans	4.00	1.00
201 a i proptosis now	Ans	True	Not Ans	40.00	12.00
215 a i pupill now	Ans	True	Not Ans	2.00	1.00
232 a i final menu	Ans	True	Not Ans	4.00	1.00
235 a i disk eodema	Ans	True	Not Ans	3.00	1.00
236 a i stop cont?	Ans	True	Not Ans	2.00	1.00
248 a i field now	Ans	True	Not Ans	4.00	1.00
249 a i 100 hue now	Ans	True	Not Ans	500.00	0.00
251 a i validate nerve answers	Ans	True	Not Ans	4.00	1.00
253 a i Hess chart now	Ans	True	Not Ans	9.00	1.00
254 a i ultra sound	Ans	True	Not Ans	4.00	0.00
255 a i CTscan	Ans	True	Not Ans	4.00	0.00
256 a i MRIscan	Ans	True	Not Ans	4.00	0.00
258 a i validate muscles answers	Ans	True	Not Ans	4.00	1.00
267 a i snellen now	Ans	True	Not Ans	17.00	1.00
269 a i snellen change	Ans	True	Not Ans	5.00	0.00
274 a i field change	Ans	True	Not Ans	5.00	1.00
278 a i 100 hue change	Ans	True	Not Ans	500.00	0.00
289 a i diplopia symptom now	Ans	True	Not Ans	4.00	1.00
291 a i diplopia symptom change	Ans	True	Not Ans	3.00	1.00
293 a i diplopia on examination now	Ans	True	Not Ans	5.00	1.00

296 a i diplopia on examination change	Ans	True	Not Ans	3.00
1.00				
298 a i proptosis opinion	Ans	True	Not Ans	3.00
1.00				
300 a i proptosis change	Ans	True	Not Ans	10.00
0.00				
305 a i Hess chart change	Ans	True	Not Ans	3.00
1.00				
309 a i lid retraction	Ans	True	Not Ans	4.00
1.00				
312 a i cornea now	Ans	True	Not Ans	5.00
1.00				
314 a i cornea change	Ans	True	Not Ans	3.00
1.00				
318 a i lid eodema now	Ans	True	Not Ans	4.00
1.00				
320 a i lid eodema change	Ans	True	Not Ans	3.00
1.00				
321 a i chemosis now	Ans	True	Not Ans	4.00
1.00				
323 a i chemosis change	Ans	True	Not Ans	3.00
1.00				
324 a i IOP straight	Ans	True	Not Ans	50.00
10.00				
325 a i IOP up	Ans	True	Not Ans	50.00
10.00				
346 ccc ?	Ans	True	Not Ans	4.00
1.00				
351 nnn ?	Ans	True	Not Ans	4.00
1.00				
357 lll ?	Ans	True	Not Ans	4.00
1.00				
363 mmm ?	Ans	True	Not Ans	4.00
1.00				
369 pro ?	Ans	True	Not Ans	3.00
1.00				
425 a i treat nerve	Ans	True	Not Ans	3.00
1.00				
435 a i critical choice	Ans	True	Not Ans	3.00
1.00				
451 a i lid tars leng deco	Ans	True	Not Ans	3.00
1.00				
458 a i lid tarso length	Ans	True	Not Ans	2.00
1.00				

114 a c tedex user	Ans	True	Not Ans	Unknown
142 a c lacrimination?	Ans	True	Not Ans	Unknown
143 a c photophobia?	Ans	True	Not Ans	Unknown
144 a c visual blurring?	Ans	True	Not Ans	Unknown
145 a c double vision?	Ans	True	Not Ans	Unknown
146 a c pain?	Ans	True	Not Ans	Unknown
147 a c Diabetic?	Ans	True	Not Ans	Unknown
148 a c Hypertensive?	Ans	True	Not Ans	Unknown
149 a c Renal?	Ans	True	Not Ans	Unknown
150 a c Pulmonaric?	Ans	True	Not Ans	Unknown
151 a c GI?	Ans	True	Not Ans	Unknown
152 a c Radioactive iodine?	Ans	True	Not Ans	Unknown
153 a c Thyroidectomy?	Ans	True	Not Ans	Unknown
154 a c Carbimazol?	Ans	True	Not Ans	Unknown
155 a c T3?	Ans	True	Not Ans	Unknown
156 a c T4?	Ans	True	Not Ans	Unknown
161 a c Eye lubricants?	Ans	True	Not Ans	Unknown
162 a c Tr for corneal ulcer?	Ans	True	Not Ans	Unknown
163 a c Lid lengthening?	Ans	True	Not Ans	Unknown
164 a c Tarsorhaphy?	Ans	True	Not Ans	Unknown

165 a c Systemic steroids?	Ans	True	Not Ans	Unknown
167 a c Radiotherapy?	Ans	True	Not Ans	Unknown
169 a c decompression?	Ans	True	Not Ans	Unknown
171 a c Prisms occlusion?	Ans	True	Not Ans	Unknown
172 a c Muscle surgery?	Ans	True	Not Ans	Unknown
177 a c Hart disease	Ans	True	Not Ans	Unknown
218 a c any invest?	Ans	True	Not Ans	Unknown
237 a c nerve invest?	Ans	True	Not Ans	Unknown
238 a c field of vision?	Ans	True	Not Ans	Unknown
239 a c 100 hue?	Ans	True	Not Ans	Unknown
240 a c muscles invest?	Ans	True	Not Ans	Unknown
241 a c Hess chart?	Ans	True	Not Ans	Unknown
242 a c ultra sound?	Ans	True	Not Ans	Unknown
243 a c CTscan?	Ans	True	Not Ans	Unknown
244 a c MRIscan?	Ans	True	Not Ans	Unknown
264 a c coroidal folds	Ans	True	Not Ans	Unknown
279 a c color blind	Ans	True	Not Ans	Unknown
297 a c six month stable diplopia	Ans	True	Not Ans	Unknown
308 a c lid lag	Ans	True	Not Ans	Unknown
428 a c your choice bad?	Ans	True	Not Ans	Unknown
454 a c lid bad choice	Ans	True	Not Ans	Unknown
604 a c peptic ulceration	Ans	True	Not Ans	Unknown
605 a c history anti steroids	Ans	True	Not Ans	Unknown
615 a c contra anasthesia?	Ans	True	Not Ans	Unknown
671 a save?	Ans	True	Not Ans	Unknown
674 a daa?	Ans	True	Not Ans	Unknown
125 a s who are you	Ans	True	Not Ans	Unknown
129 a s patient name	Ans	True	Not Ans	Unknown
130 a s patient DOB	Ans	True	Not Ans	Unknown
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176 a s hospital number?	Ans	True	Not Ans	Unknown

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D:\SV5

...pv89-ap25
Bad command or file name

D:\SV5

...pv  89-ap25

SAVOIR Prior Value Checker Version 1.5
Implementation Language  -  PRO PASCAL
Copyright (c) Intelligent Systems International Ltd, Redhill, UK, 1987

Standard Trap Handler
Listings to C)onsole, P)rinter, F)ile or N)owhere ? p

SAVOIR Prior Value Checker NO errors found.

D:\SV5

...
```

Appendix D5 - Model statistics

Summary of Model

No	Line	Name	Type	
1	0	AT_START	Question	Condition
2	0	AT_END	Variable	Condition
3	0	AT_QUIT	Question	Condition
4	0	AT_HELP	Variable	Condition
5	0	AT_RESTORE	Question	Condition
6	0	AT_RESTART	Question	Condition
7	30	f_a_s_patient_name	Variable	String
8	31	f_a_s_patient_DOB	Variable	String
9	32	f_a_s_patient_sex	Variable	String
10	38	f_a_c_Diabetic?	Variable	Condition
11	39	f_a_c_Hypertensive?	Variable	Condition
12	40	f_a_c_Renal?	Variable	Condition
13	41	f_a_c_Pulmonaric?	Variable	Condition
14	42	f_a_c_GI?	Variable	Condition
15	43	f_a_c_peptic_ulceration	Variable	Condition
16	44	f_a_c_history_anti_steroids	Variable	Condition
17	45	f_a_c_contra_anasthesia?	Variable	Condition
18	46	f_a_c_Hart_disease	Variable	Condition
19	55	f_a_i_thyroid_status	Variable	Number
20	56	f_a_c_Radioactive_iodine?	Variable	Condition
21	57	f_a_c_Thyroidectomy?	Variable	Condition
22	58	f_a_c_Carbimazol?	Variable	Condition
23	64	f_a_c_lacrimination?	Variable	Condition
24	65	f_a_c_photophobia?	Variable	Condition
25	66	f_a_c_visual_blurring?	Variable	Condition
26	67	f_a_c_double_vision?	Variable	Condition
27	68	f_a_c_pain?	Variable	Condition
28	69	f_a_i_patient_most_troublesome	Variable	Number
29	70	f_a_p_patient_appearance	Variable	Probability
30	79	f_a_i_eye_disease_duration	Variable	Number
31	80	f_a_c_Eye_lubricants?	Variable	Condition
32	81	f_a_c_Tr_for_corneal_ulcer?	Variable	Condition
33	82	f_a_c_Lid_lengthening?	Variable	Condition
34	83	f_a_c_Tarsorhaphy?	Variable	Condition
35	84	f_a_c_Systemic_steroids?	Variable	Condition
36	85	f_a_c_Radiotherapy?	Variable	Condition
37	86	f_a_c_decompression?	Variable	Condition
38	87	f_a_c_Prisms_occlusion?	Variable	Condition
39	88	f_a_c_Muscle_surgery?	Variable	Condition
40	109	f_a_i_disk_eodema	Variable	Number
41	110	f_a_c_coroidal_folds	Variable	Condition
42	111	f_a_i_snellen_now	Variable	Number
43	112	f_a_i_field_now	Variable	Number
44	113	f_a_i_100_hue_now	Variable	Number
45	114	f_a_c_color_blind	Variable	Condition
46	115	f_a_i_diplopia_symptom_now	Variable	Number
47	116	f_a_i_diplopia_on_examination_now	Variable	Number
48	117	f_a_i_proptosis_opinion	Variable	Number
49	118	f_a_i_proptosis_now	Variable	Number
50	119	f_a_i_Hess_chart_now	Variable	Number
51	120	f_a_i_ultra_sound	Variable	Number
52	121	f_a_c_lid_lag	Variable	Condition
53	122	f_a_i_lid_retraction	Variable	Number
54	123	f_a_i_cornea_now	Variable	Number
55	124	f_a_i_lid_eodema_now	Variable	Number
56	125	f_a_i_chemosis_now	Variable	Number
57	126	f_n_IOP_dif	Variable	Number

58	132	f_m_i_nerve_condition	Variable	Number
59	133	f_m_i_muscles_condition	Variable	Number
60	134	f_m_i_cornea_condition	Variable	Number
61	135	f_m_i_lid_condition	Variable	Number
62	137	m_i_nerve_condition	Variable	Number
63	138	m_i_muscles_condition	Variable	Number
64	139	m_i_cornea_condition	Variable	Number
65	140	m_i_lid_condition	Variable	Number
66	148	f_m_c_field_of_vision	Variable	Condition
67	149	f_m_c_100_hue_test	Variable	Condition
68	150	f_m_c_Hess_chart	Variable	Condition
69	151	f_m_c_ultra_sound	Variable	Condition
70	156	m_c_field_of_vision	Variable	Condition
71	157	m_c_100_hue_test	Variable	Condition
72	158	m_c_Hess_chart	Variable	Condition
73	159	m_c_ultra_sound	Variable	Condition
74	165	f_m_i_action	Variable	Number
75	167	m_i_action	Variable	Number
76	173	f_m_c_eye_lubricants	Variable	Condition
77	174	f_m_c_systemic_steroids	Variable	Condition
78	175	f_m_c_raise_head_w_dioretics	Variable	Condition
79	176	f_m_c_raise_head_w_no_dioretics	Variable	Condition
80	177	f_m_c_occlusion_or_prism	Variable	Condition
81	178	f_m_c_Radiotherapy	Variable	Condition
82	179	f_m_c_anti_glaucoma_medications	Variable	Condition
83	181	m_c_eye_lubricants	Variable	Condition
84	182	m_c_systemic_steroids	Variable	Condition
85	183	m_c_raise_head_w_dioretics	Variable	Condition
86	184	m_c_raise_head_w_no_dioretics	Variable	Condition
87	185	m_c_occlusion_or_prism	Variable	Condition
88	186	m_c_Radiotherapy	Variable	Condition
89	187	m_c_anti_glaucoma_medications	Variable	Condition
90	194	f_m_c_tarsoraphy	Variable	Condition
91	195	f_m_c_lid_lenghthen	Variable	Condition
92	196	f_m_c_decompression	Variable	Condition
93	197	f_m_c_muscles_surgery	Variable	Condition
94	199	m_c_tarsoraphy	Variable	Condition
95	200	m_c_lid_lenghthen	Variable	Condition
96	201	m_c_decompression	Variable	Condition
97	202	m_c_muscles_surgery	Variable	Condition
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111	396	g_history	Group	Null
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115	414	a_i_novice_user_intro	Question	Number
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125	510	a_s_who_are_you	Question	String
126	516	a_i_user_experience	Question	Number

127	530		Action	Null
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112	554	g_patient_personal	Group	Null
129	559	a_s_patient_name	Question	String
130	563	a_s_patient_DOB	Question	String
131	571	a_i_patient_age	Question	Number
132	576	a_s_patient_sex	Question	String
113	587	g_patient_complaint_history	Group	Null
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142	601	a_c_lacrimination?	Question	Condition
143	612	a_c_photophobia?	Question	Condition
144	625	a_c_visual_blurring?	Question	Condition
145	639	a_c_double_vision?	Question	Condition
146	651	a_c_pain?	Question	Condition
134	664	a_i_patient_most_troublesome	Question	Number
135	682	a_i_eye_disease_duration	Question	Number
136	692	a_i_thyroid_status	Question	Number
137	703	a_i_thyroid_disease_duration	Question	Number
138	719	g_previous_sys_conditions	Group	Null
147	723	a_c_Diabetic?	Question	Condition
148	734	a_c_Hypertensive?	Question	Condition
149	745	a_c_Renal?	Question	Condition
150	757	a_c_Pulmonaric?	Question	Condition
151	767	a_c_GI?	Question	Condition
139	779	g_previous_thyroid_treatment	Group	Null
152	784	a_c_Radioactive_iodine?	Question	Condition
153	800	a_c_Thyroidectomy?	Question	Condition
154	815	a_c_Carbimazol?	Question	Condition
155	830	a_c_T3?	Question	Condition
156	846	a_c_T4?	Question	Condition
157	859	g_thyroid_biochemistry	Group	Null
158	862	a_i_T3	Question	Number
159	866	a_i_T4	Question	Number
160	871	a_i_TSH	Question	Number
140	875	g_previous_eye_treatment	Group	Null
161	887	a_c_Eye_lubricants?	Question	Condition
162	908	a_c_Tr_for_corneal_ulcer?	Question	Condition
163	928	a_c_Lid_lengthening?	Question	Condition
164	948	a_c_Tarsorhaphy?	Question	Condition
165	971	a_c_Systemic_steroids?	Question	Condition
166	990	a_i_Sys_steroids_effect?	Question	Number
167	1009	a_c_Radiotherapy?	Question	Condition
168	1028	a_i_Radiotherapy_effect?	Question	Number
169	1049	a_c_decompression?	Question	Condition
170	1067	a_i_decompression_effect?	Question	Number
171	1086	a_c_Prisms_occlusion?	Question	Condition
172	1106	a_c_Muscle_surgery?	Question	Condition
141	1125	a_p_patient_appearance	Question	Probability
173	1134	a_i_main_menu	Question	Number
174	1146	a_i_teaching_menu	Question	Number
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176	1164	a_s_hospital_number?	Question	String
177	1170	a_c_Hart_disease	Question	Condition
178	1177	last_visit_report	Variable	Condition
179	1178	please_get	Variable	Condition
180	1179	please_obtain	Variable	Condition
99	1180	please_load	Variable	Condition
181	1182	a_begin	Variable	Condition
182	1183	b_begin	Variable	Condition
183	1184	c_begin	Variable	Condition
184	1185	clinical_finished	Variable	Condition
185	1186	first_report	Variable	Condition
186	1187	validate_finished	Variable	Condition
187	1189	please_save	Variable	Condition
188	1190	please_sheel	Variable	Condition
189	1191	please_store	Variable	Condition

190	1193	f_a_s_who_are_you	Variable	String
191	1194	m_a_s_who_are_you	Variable	String
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193	1197	f_a_i_user_experience	Variable	Number
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236	1389	a_i_stop_cont?	Question	Number
220	1403	c_nerve_invest?	Variable	Condition
237	1408	a_c_nerve_invest?	Question	Condition
221	1415	c_field_of_vision?	Variable	Condition
238	1420	a_c_field_of_vision?	Question	Condition
222	1430	c_100_hue?	Variable	Condition
239	1435	a_c_100_hue?	Question	Condition
225	1447	c_muscles_invest?	Variable	Condition
240	1453	a_c_muscles_invest?	Question	Condition
226	1460	c_Hess_chart?	Variable	Condition
241	1466	a_c_Hess_chart?	Question	Condition
227	1478	c_ultra_sound?	Variable	Condition
242	1484	a_c_ultra_sound?	Question	Condition
228	1496	c_CTscan?	Variable	Condition
243	1502	a_c_CTscan?	Question	Condition
229	1514	c_MRIscan?	Variable	Condition
244	1520	a_c_MRIscan?	Question	Condition
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259	1575	p_mal_nerve	Variable	Probability
247	1601	p_sug_mal_nerve	Variable	Probability
223	1616	p_test_mal_nerve	Variable	Probability
217	1636	p_disk_eodima	Variable	Probability
263	1643	p1_disk_eodima	Variable	Probability
235	1646	a_i_disk_eodema	Question	Number
216	1660	c_coroidal_folds	Variable	Condition
264	1665	a_c_coroidal_folds	Question	Condition
215	1675	a_i_pupill_now	Question	Number
260	1688	p_visual_acuity_drop	Variable	Probability
265	1700	p1_visual_acuity_drop	Variable	Probability
266	1710	p_snellen_acuity_drop	Variable	Probability
204	1721	p_snellen_now	Variable	Probability
267	1726	a_i_snellen_now	Question	Number
205	1744	p_snellen_change	Variable	Probability
268	1749	p1_snellen_change	Variable	Probability
269	1756	a_i_snellen_change	Question	Number
270	1825	p_vision_dummy	Variable	Probability
261	1828	p_field_of_vision	Variable	Probability
271	1843	p_field_now	Variable	Probability
248	1849	a_i_field_now	Question	Number
272	1865	P_field_change	Variable	Probability
273	1871	p1_field_change	Variable	Probability
274	1879	a_i_field_change	Question	Number
262	1899	p_100_hue_test	Variable	Probability
275	1915	p_100_hue_now	Variable	Probability
249	1940	a_i_100_hue_now	Question	Number
276	1950	P_100_hue_change	Variable	Probability
277	1956	p1_100_hue_change	Variable	Probability
278	1966	a_i_100_hue_change	Question	Number
279	1997	a_c_color_blind	Question	Condition
280	2016	p_mal_muscles	Variable	Probability
252	2042	p_sug_mal_muscles	Variable	Probability
230	2052	p_test_mal_muscles	Variable	Probability
281	2065	p_diplopia	Variable	Probability
287	2076	p_diplopia_symptom	Variable	Probability
197	2088	p_diplopia_symptom_now	Variable	Probability

289	2095	a_i_diplopia_symptom_now	Question	Number
198	2111	p_diplopia_symptom_change	Variable	Probability
290	2117	p1_diplopia_symptom_change	Variable	Probability
291	2126	a_i_diplopia_symptom_change	Question	Number
288	2141	p_diplopia_on_examination	Variable	Probability
199	2151	p_diplopia_on_examination_now	Variable	Probability
293	2158	a_i_diplopia_on_examination_now	Question	Number
200	2173	g_diplopia_on_examination_change	Group	Null
292	2176	p_diplopia_on_examination_change	Variable	Probability
295	2182	p1_diplopia_on_examination_change	Variable	Probability
296	2191	a_i_diplopia_on_examination_change	Question	Number
294	2203	c_six_month_stable_diplopia	Variable	Condition
297	2209	a_c_six_month_stable_diplopia	Question	Condition
282	2225	p_proptosis	Variable	Probability
202	2238	p_proptosis_now	Variable	Probability
298	2245	a_i_proptosis_opinion	Question	Number
201	2263	a_i_proptosis_now	Question	Number
203	2277	p_proptosis_change	Variable	Probability
299	2284	p1_proptosis_change	Variable	Probability
300	2294	a_i_proptosis_change	Question	Number
283	2317	p_Hess_chart	Variable	Probability
301	2330	p_Hess_chart_now	Variable	Probability
253	2336	a_i_Hess_chart_now	Question	Number
303	2352	p_hess_dummy	Variable	Probability
302	2357	p_Hess_chart_change	Variable	Probability
304	2364	p1_Hess_chart_change	Variable	Probability
305	2372	a_i_Hess_chart_change	Question	Number
284	2391	p_ultra_sound	Variable	Probability
254	2399	a_i_ultra_sound	Question	Number
285	2418	p_CTscan	Variable	Probability
255	2426	a_i_CTscan	Question	Number
286	2441	p_MRIscan	Variable	Probability
256	2449	a_i_MRIscan	Question	Number
306	2467	p_mal_lid	Variable	Probability
307	2490	p_uncoverage	Variable	Probability
206	2499	p_lid_lag	Variable	Probability
308	2504	a_c_lid_lag	Question	Condition
207	2513	p_lid_retraction	Variable	Probability
309	2518	a_i_lid_retraction	Question	Number
310	2537	p_mal_cornea	Variable	Probability
311	2558	p_cornea	Variable	Probability
212	2569	p_cornea_now	Variable	Probability
312	2572	a_i_cornea_now	Question	Number
213	2590	p_cornea_change	Variable	Probability
313	2596	p1_cornea_change	Variable	Probability
314	2604	a_i_cornea_change	Question	Number
315	2625	g_soft_tissue	Group	Null
316	2633	p_lid_eodema	Variable	Probability
208	2644	p_lid_eodema_now	Variable	Probability
318	2648	a_i_lid_eodema_now	Question	Number
209	2661	p_lid_eodema_change	Variable	Probability
319	2667	p1_lid_eodema_change	Variable	Probability
320	2675	a_i_lid_eodema_change	Question	Number
317	2692	p_chemosis	Variable	Probability
210	2703	p_chemosis_now	Variable	Probability
321	2707	a_i_chemosis_now	Question	Number
211	2723	p_chemosis_change	Variable	Probability
322	2730	p1_chemosis_change	Variable	Probability
323	2737	a_i_chemosis_change	Question	Number
214	2750	n_IOP_dif	Variable	Number
325	2841	a_i_IOP_up	Question	Number
324	2867	a_i_IOP_straight	Question	Number
326	2876		Action	Null
328	2889		Action	Null
329	2903		Action	Null
330	2918		Action	Null

331	2931		Action	Null
332	2945		Action	Null
333	2958		Action	Null
334	2973		Action	Null
224	2990	g_validate_nerve_answers	Group	Null
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251	3000	a_i_validate_nerve_answers	Question	Number
250	3017	c_nerve_sug_test_dif	Variable	Condition
336	3023	n_sug_mal_nerve	Variable	Number
337	3028	n_test_mal_nerve	Variable	Number
339	3033		Action	Null
340	3046		Action	Null
341	3059		Action	Null
195	3083	z_begin	Variable	Condition
342	3085		Action	Null
343	3088	s_already_said	Variable	String
344	3089	s_lid_already_said	Variable	String
345	3094	cccc	Variable	Number
347	3100	cccc_converted	Variable	Number
348	3106	cccc_converted_a	Variable	Number
349	3113	cccc_converted_b	Variable	Number
350	3120	cccc_converted_c	Variable	Number
335	3125	nnnn	Variable	Number
352	3131	nnnn_converted	Variable	Number
353	3137	nnnn_converted_a	Variable	Number
354	3144	nnnn_converted_b	Variable	Number
355	3151	nnnn_converted_c	Variable	Number
356	3157	llll	Variable	Number
358	3163	llll_converted	Variable	Number
359	3169	llll_converted_a	Variable	Number
360	3176	llll_converted_b	Variable	Number
361	3183	llll_converted_c	Variable	Number
362	3189	mmmm	Variable	Number
364	3195	mmmm_converted	Variable	Number
365	3201	mmmm_converted_a	Variable	Number
366	3208	mmmm_converted_b	Variable	Number
367	3215	mmmm_converted_c	Variable	Number
368	3219	prop	Variable	Number
370	3225	prop_converted	Variable	Number
371	3231	prop_converted_a	Variable	Number
372	3238	prop_converted_b	Variable	Number
346	3244	ccc_?	Question	Number
351	3247	nnn_?	Question	Number
357	3250	lll_?	Question	Number
363	3253	mmm_?	Question	Number
369	3256	pro_?	Question	Number
373	3259		Action	Null
374	3266		Action	Null
375	3271	c_announce_action	Variable	Condition
377	3276	i_choose_action_1	Variable	Number
378	3284	i_choose_action_2	Variable	Number
379	3292	i_choose_action_3	Variable	Number
380	3300	i_choose_action_4	Variable	Number
381	3308	i_choose_action_5	Variable	Number
382	3316	i_choose_action_6	Variable	Number
383	3324	i_choose_action_7	Variable	Number
384	3332	i_choose_action_8	Variable	Number
385	3339		Action	Null
386	3344		Action	Null
387	3352		Action	Null
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389	3368		Action	Null
390	3377		Action	Null
391	3385		Action	Null
392	3393		Action	Null
393	3400		Action	Null

394	3410		Action	Null
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395	3422		Action	Null
396	3426	c_no_ulcer	Variable	Condition
397	3469		Action	Null
398	3475	c_tr_ulcer	Variable	Condition
399	3479		Action	Null
400	3490	c_tr_ulcer_lubrication	Variable	Condition
401	3496		Action	Null
402	3504	c_tr_ulc_nerv_w_steroids	Variable	Condition
404	3508		Action	Null
405	3518	c_tr_ulc_nerv_w_radiotherapy	Variable	Condition
407	3522		Action	Null
408	3539	c_tr_ulc_nerv_critical	Variable	Condition
409	3545	s_proptosis	Variable	String
410	3550	s1_proptosis	Variable	String
411	3556	s2_proptosis	Variable	String
412	3561	s_anti_steroids	Variable	String
413	3571	s_anti_surgery	Variable	String
415	3581	s_anti_radio	Variable	String
416	3592	s_TEDEX_choice	Variable	String
418	3597	s1_TEDEX_choice	Variable	String
420	3602	s2_TEDEX_choice	Variable	String
417	3608	c_TEDEX_choice	Variable	Condition
419	3616	c1_TEDEX_choice	Variable	Condition
421	3625	c2_TEDEX_choice	Variable	Condition
422	3637	s_choose_steroids	Variable	String
423	3647	s_choose_decompression	Variable	String
424	3656	s_choose_radiotherapy	Variable	String
425	3664	a_i_treat_nerve	Question	Number
426	3685		Action	Null
427	3699		Action	Null
429	3718	s_contra_indications	Variable	String
430	3723	s1_contra_indications	Variable	String
431	3728	s2_contra_indications	Variable	String
428	3732	a_c_your_choice_bad?	Question	Condition
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433	3769	s_critical_choice	Variable	String
434	3776	s1_critical_choice	Variable	String
435	3783	a_i_critical_choice	Question	Number
436	3800		Action	Null
437	3807		Action	Null
438	3822	c_tr_nerve_w_steroids	Variable	Condition
439	3830		Action	Null
440	3838	c_tr_nerve_w_decompression	Variable	Condition
441	3847		Action	Null
442	3857	c_tr_nerve_w_radiotherapy	Variable	Condition
443	3869	c_start_treating_lid	Variable	Condition
444	3879	c_do_not_decompress	Variable	Condition
445	3882	s_lid_condition	Variable	String
446	3887	s1_lid_condition	Variable	String
447	3893	s_lid_A_TEDEX_choice	Variable	String
448	3900	s1_lid_A_TEDEX_choice	Variable	String
449	3907	s2_lid_A_TEDEX_choice	Variable	String
450	3912	s_lid_choose_decomp	Variable	String
451	3918	a_i_lid_tars_leng_deco	Question	Number
452	3933		Action	Null
453	3938		Action	Null
454	3942	a_c_lid_bad_choice	Question	Condition
455	3953		Action	Null
456	3961	s_lid_B_TEDEX_choice	Variable	String
457	3966	s1_lid_B_TEDEX_choice	Variable	String
458	3970	a_i_lid_tarso_length	Question	Number
459	3983		Action	Null
460	3990		Action	Null
461	4000	c_tr_lid_drcompress	Variable	Condition

462	4007		Action	Null
463	4015	c_tr_lid_lengthening	Variable	Condition
464	4021		Action	Null
465	4028	c_tr_tarsoraphy	Variable	Condition
466	4035		Action	Null
467	4047	c_postpone_lid_tr	Variable	Condition
468	4053		Action	Null
469	4062	c_tr_cornea_lid_lubrication	Variable	Condition
470	4067		Action	Null
471	4071	c_start_treating_muscles	Variable	Condition
472	4103	c_stable	Variable	Condition
473	4107		Action	Null
476	4116	c_coping	Variable	Condition
477	4120		Action	Null
479	4125	c_do_not_decomp_muscles	Variable	Condition
475	4133	c_any_other_troubles	Variable	Condition
474	4137	c_muscles_troubles	Variable	Condition
480	4146		Action	Null
481	4152	c_do_deco_first_muscles	Variable	Condition
482	4160		Action	Null
483	4166	c_do_muscles_surgery	Variable	Condition
484	4177		Action	Null
485	4183	c_do_muscles_surgery_w_care	Variable	Condition
486	4192		Action	Null
478	4198	c_postpone_muscles_surgery	Variable	Condition
487	4207		Action	Null
488	4213	c_prism_or_occlussion	Variable	Condition
489	4219		Action	Null
490	4225	c_do_nothing_for_muscles	Variable	Condition
232	4231	a_i_final_menu	Question	Number
491	4247		Action	Null
492	4252		Action	Null
493	4258		Action	Null
494	4262		Action	Null
327	4266	c_show_final_menu	Variable	Condition
495	4279		Action	Null
502	4305		Action	Null
528	4338		Action	Null
496	4369	s_user_experience	Variable	String
537	4374	s1_user_experience	Variable	String
538	4379	s2_user_experience	Variable	String
539	4384	s3_user_experience	Variable	String
540	4389	s4_user_experience	Variable	String
541	4394	s5_user_experience	Variable	String
497	4399	s_lacrimination	Variable	String
498	4405	s_photophobia	Variable	String
499	4410	s_blurring	Variable	String
500	4416	s_double_vision	Variable	String
501	4421	s_pain	Variable	String
542	4428	c_more_than_2_symtoms	Variable	Condition
503	4436	s_Eye_lubricants?	Variable	String
504	4444	s_Tr_f_cr_ulcer?	Variable	String
505	4451	s_Lid_lengthening?	Variable	String
506	4458	s_Tarsoraphy?	Variable	String
507	4465	s_Systemic_steroids?	Variable	String
509	4472	s_Radiotherapy?	Variable	String
511	4479	s_decompression?	Variable	String
513	4486	s_Prisms_occlussion?	Variable	String
514	4493	s_Muscle_surgery?	Variable	String
508	4500	s_steroids_effect	Variable	String
543	4505	s1_steroids_effect	Variable	String
544	4510	s2_steroids_effect	Variable	String
510	4518	s_Radiotherapy_effect	Variable	String
545	4523	s1_Radiotherapy_effect	Variable	String
546	4528	s2_Radiotherapy_effect	Variable	String
512	4536	s_decompression_effect	Variable	String

547	4541	s1_decompression_effect	Variable	String
548	4546	s2_decompression_effect	Variable	String
515	4553	s_thyroid_status	Variable	String
549	4558	s1_thyroid_status	Variable	String
550	4563	s2_thyroid_status	Variable	String
516	4571	s_Radioactive_iodine	Variable	String
517	4578	s_Thyroidectomy	Variable	String
518	4585	s_Carbimazol	Variable	String
519	4592	s_T3	Variable	String
520	4597	s_T4	Variable	String
521	4603	s_snellen_now	Variable	String
551	4608	s1_snellen_now	Variable	String
552	4613	s2_snellen_now	Variable	String
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568	4709	s2_lid_retract	Variable	String
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523	4721	s_lid_lag	Variable	String
570	4726	s1_lid_lag	Variable	String
524	4733	s_lid_eodema	Variable	String
571	4739	s1_lid_eodema	Variable	String
572	4745	s2_lid_eodema	Variable	String
573	4752	s3_lid_eodema	Variable	String
525	4760	s_chemosis	Variable	String
574	4766	s1_chemosis	Variable	String
575	4772	s2_chemosis	Variable	String
576	4779	s3_chemosis	Variable	String
526	4787	s_cornea	Variable	String
577	4793	s1_cornea	Variable	String
578	4799	s2_cornea	Variable	String
579	4806	s3_cornea	Variable	String
580	4812	s4_cornea	Variable	String
527	4820	s_pupill	Variable	String
581	4826	s1_pupill	Variable	String
529	4833	s_disk_eodema	Variable	String
582	4839	s1_disk_eodema	Variable	String
583	4845	s2_disk_eodema	Variable	String
530	4853	s_coroidal_fld	Variable	String
584	4859	s1_coroidal_fld	Variable	String
531	4868	s_diplopia_on_examination	Variable	String
585	4875	s1_diplopia_on_examination	Variable	String
586	4882	s2_diplopia_on_examination	Variable	String
587	4890	s3_diplopia_on_examination	Variable	String
588	4897	s4_diplopia_on_examination	Variable	String
532	4903	s_cosmetic_appearance	Variable	String
533	4910	s_field	Variable	String
589	4916	s1_field	Variable	String
590	4922	s2_field	Variable	String
591	4929	s3_field	Variable	String
534	4939	s_ultra_sound	Variable	String
592	4945	s1_ultra_sound	Variable	String
593	4951	s2_ultra_sound	Variable	String

594	4958	s3_ultra_sound	Variable	String
595	4964	s4_ultra_sound	Variable	String
535	4974	s_CTscan	Variable	String
596	4980	s1_CTscan	Variable	String
597	4986	s2_CTscan	Variable	String
598	4993	s3_CTscan	Variable	String
599	4999	s4_CTscan	Variable	String
536	5008	s_MRIscan	Variable	String
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601	5020	s2_MRIscan	Variable	String
602	5027	s3_MRIscan	Variable	String
603	5033	s4_MRIscan	Variable	String
604	5044	a_c_peptic_ulceration	Question	Condition
605	5053	a_c_history_anti_steroids	Question	Condition
403	5061	anti_steroids	Variable	Condition
606	5064	c_anti_steroids	Variable	Condition
607	5072		Action	Null
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610	5104	s_Hyper_tensive	Variable	String
611	5111	s_female_over45	Variable	String
612	5119	s_steroids_side_effect	Variable	String
613	5127	s_peptic_ulceration	Variable	String
614	5135		Action	Null
615	5162	a_c_contra_anasthesia?	Question	Condition
414	5170	anti_surgery	Variable	Condition
616	5174	c_anti_surgery	Variable	Condition
617	5178		Action	Null
618	5187		Action	Null
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634	5368	i_validate_muscles_answers	Variable	Number
258	5380	a_i_validate_muscles_answers	Question	Number
257	5399	c_muscles_sug_test_dif	Variable	Condition
632	5405	n_sug_mal_muscles	Variable	Number
633	5410	n_test_mal_muscles	Variable	Number
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639	5474		Action	Null
640	5482		Action	Null
641	5491		Action	Null
642	5504		Action	Null
643	5512		Action	Null
644	5522		Action	Null
645	5532		Action	Null
646	5548		Action	Null
647	5553		Action	Null
648	5560		Action	Null
649	5565		Action	Null
650	5575		Action	Null
651	5590		Action	Null

```
  652 5609                                                  Action        Null
  653 5616                                                  Action        Null
  654 5626                                                  Action        Null
  655 5635                                                  Action        Null
  656 5648                                                  Action        Null
  657 5694                                                  Action        Null
  658 5748                                                  Action        Null
  659 5769                                                  Action        Null
  660 5801                                                  Action        Null
  661 5808                                                  Action        Null
  662 5817                                                  Action        Null
  663 5827                                                  Action        Null
  664 5837                                                  Action        Null
  665 5840                                                  Action        Null
  666 5846                                                  Action        Null
  667 5856                                                  Action        Null
  668 5869                                                  Action        Null
  669 5875                                                  Action        Null
  670 5887                                                  Action        Null
  672 5891                                                  Action        Null
  673 5894                                                  Action        Null
  671 5898  a_save?                                         Question    Condition
  674 5901  a_daa?                                          Question    Condition
  675 5904                                                  Action        Null
  676 5908                                                  Action        Null

Statistics of Model.

   Questions     113
   Variables     402
     Actions     148
      Groups      13
       Links       0
   ------------------
   Total of      676 Items   (Maximum is    2250)
   Code Size   19303 bytes   (Maximum is   65500)



SAVOIR Prior Value Checker NO errors found.

D:\SV5

...scomp 89-ap25

SAVOIR Rules Compiler Version 1.5
Implementation Language  -  PRO PASCAL
Copyright (c) Intelligent Systems International Ltd, Redhill, U.K. 1987

Listings to C)onsole, P)rinter, F)ile or N)owhere ? p

Enter Listing Options
A gives All, or as many as required of:-
M - Model Source
S - Model Summary
F - Function Summary
X - CrossReference
 Options ? s

Savoir Advice Language Compilation - No Compiler Detected Errors

D:\SV5

...
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Appendix D6 - NEXPERT

NEXPERT OBJECT is an Artificial Intelligence library written in the C language. It is designed for integration of applications into operational environments written in C, FORTRAN, ADA, COBOL and PASCAL.

Development and delivery of expert system applications are possible on the VAX, IBM/AT, IBM-386, MAC II and Unix workstations with full cross compatibility.

NEXPERT comprises a hybrid of expert system building tools, object and rule-oriented representation routines and an incremental compiler. It has a powerful and user-friendly graphics interfaces which provides the following facilities:

- Graphics Knowledge Editors.
- Windows.
- Graphics Knowledge Browsers.
- Custom End-User Interface.

The shell has an open architecture which means that it can be integrated with the following environments:

1- External programmes.

2- DBase III, Lotus 1-2-3 and Data base Queries

3- Multitasking environments.

The facilities which are available in this tool were only available on expensive LISP machines.

Appendix E - Details of equipment and trade-marks

Equipment:

EGA-Wonder display card:

Has connectors for EGA and RGB colour monitors, TTL and Composite Momochrome Monitors. It supports the following graphics modes:

- IBM VGA 640x560
- High resolution MultiSync graphics 800x560, 752x410 and 640x480
- IBM EGA and CGA graphics
- Hercules graphics

NEC MULTISYNC II Monitor:

Is a 14 " MultiSynic high resolution monitor which offers automatic synchronisation and is suitable for use with IBM/XT/AT and PS/2 plus Apple MacII microcomputers.

Trade-marks

AMT™	Applied Microsystems Technology Ltd.
Apple MacIntosh™	Apple Computer Corp.
Cannon™	Cannon International.
dBase III PLUS™	Ashton-Tate Corp.
EGA-Wonder™	ATI Technologies Inc.
FUJITSU™	Fujitsu Inc.
Halo-88™	Media Cybernetics Inc.
Hercules ™	Hercules Computer.
IBM™	International Business Machine Corp.
Lotus 1-2-3™	Lotus Development Corp.
MS-DOS™	Microsoft Corp.
NEC MultiSync™	NEC Corporation
NEXPERT™ OBJECT	Neuron Data Corp.
PC-DOS™	International Business Machine Corp.
SAVOIR™	Intelligent Systems International Ltd.

SPSS DATA ENTRY II™	SPSS Inc.
SPSS/PC+ ADVANCED STATISTICS™	SPSS Inc.
SPSS/PC+ BASE MODULE™	SPSS Inc.
SPSS/PC+ TABLES™	SPSS Inc.
Turbo C™	Borland International
Turbo Graphix Toolbox™	Borland International
Turbo Pascal™	Borland International
Unix™	Bell Laboratories
VAX™	Digital Equipment Corp.

TEDEX USER'S INSTRUCTION

INTRODUCTION:

TEDEX is an experimental prototype expert system which provides advice about the diagnosis and management of thyroid ophthalmopathy. Expert systems are computer systems, comprising both hardware and software that mimic the expert's thought process to solve complex problems in a given field.

TEDEX is a 'disease-specific' expert system, i.e., it is designed to handle only patients who have been provisionally diagnosed as suffering from thyroid ophthalmopathy. It is not designed to give lists of differential diagnoses or to deal with other ophthalmic disordered.

The treatment options which are provided by the system are kept simple and included only the widely accepted and proven lines of treatment. Avoiding controversial or experimental therapeutic approaches served several purposes: The project could be finished in the allocated time, testing and modifications were readily done and the user acceptability was enhanced.

TEDEX is designed with the following intended users in mind: General Ophthalmologists, Endocrinologists, General Practitioners and perhaps medical students at a later stage. System performance should be determined with respect to the intended user.

HOW TO USE TEDEX:

(1) Turn the computer on.

(2) In the DOS prompt load the system by typing [TEDEX] then press the 'Enter' key.

(3) After the display of the logo and introductory screens, the opening menu will appear on the screen (Figure Q.1). Type [1] followed by pressing the 'Enter' key to select 'New patient'.

(4) The dialogue with the system continues in the form of questions and answers. Questions my require a string (e.g., patient name), a number (e.g., year of birth), or a selection from a multiple choice question where only one item is chosen. Some questions are of the yes/no type and require a Y or N.

(5) Entering [B] will take you one step back by displaying the previous question, as long as no action has been fired (i.e., no conclusion has been reached by pursuing this particular line of reasoning). Entering [B] again will take you one more step back. This facility is intended to allow the user to change his mind or to correct a wrong entry.

(6) Entering [H] will take you to a list of general help function keys.

(7) Entering [A] will give you an amplification on the current question. This facility is only provided for questions which are deemed by the developers to be prone to misinterpretation.

(8) Entering [E] will provide an explanation of the system's conclusion (i.e., why a diagnosis has been made or a management plan has been provided). This includes the rationale behind the conclusions and the most important information relevant to this particular conclusion.

(9) The system gives its conclusions in the form of two reports. The first report is displayed after answering the questions related to history and clinical examination. The

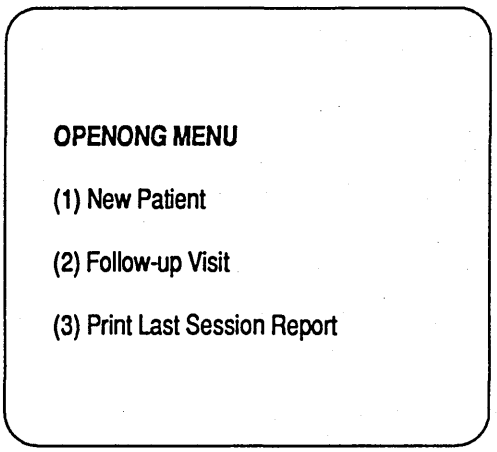

Figure Q1

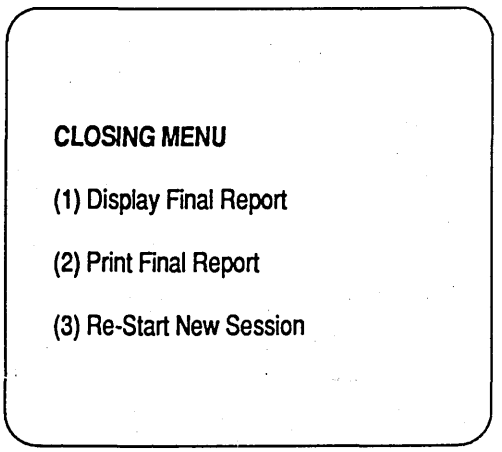

Figure Q2

final report is provided after the results of the requested investigations have been entered. This report is stored on the computer hard disk at the end of the session.

(10) After the final report is displayed, the closing menu appears (Figure Q.2). This gives you the choice of printing the final report of the current session. You can choose either to start another session or to quit the system.

"TEDEX" THYROID EYE DISEASE EXPERT SYSTEM — AN EXAMPLE OF AN OPTHALMIC INTEGRATED 'CLINIC AUTOMATION' SYSTEM

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Keywords: Expert systems, clinic automation, ophthalmology, thyroid eye disease, charts reading.

Abstract:

Most general ophthalmologists lack expertise in the management of dysthyroid eye disease due to the rarity of the condition. This may result in an incorrect or delayed diagnosis and unsatisfactory treatment. "TEDEX" is an expert system designed to assist ophthalmologists, endocrinologists, general practitioners, and medical students in the diagnosis, management, and treatment of this disease. TEDEX is designed to work in a clinical environment (whilst the patient is present). In order to emulate the clinician, TEDEX performs several modular functions: data acquisition, measure-ment interpretation, diagnosis, treatment planning, and patient follow-up. To perform these functions, TEDEX has interfaces to a data base (patient files), a scanner (ophthalmic chart reader), and "TEMPRAC" (temporal visual assessment tester), thereby integrating an assembly to create a 'clinic automation' system.

1 INTRODUCTION

In the early 1970's researchers at several institutions simultaneously began to investigate the potential of clinical applications of symbolic reasoning techniques. It was the landmark paper by Gorry et al (Ref. 1) in 1973, that first critically analysed the hitherto conventional approaches to computer-based clinical decision making and outlined his reasons for turning to the newer symbolic techniques. His conclusions included the following four points: (i) Clinical judgement is based less on detailed knowledge than it is on gross 'chunks' of knowledge, along with a good deal of experience; (ii) Clinicians know facts, but their knowledge is also largely judgemental; (iii) Clinicians recognize levels of belief or certainty associated with many of the rules; and (iv) It is easier for experts to state their rules in response to perceived misconceptions rather than it is for them to generate

such decision criteria a priori. It was perhaps inevitable that some medical researchers would divert to the expert systems field for new methodologies due to the limitations of the older techniques.

Medicine was a pioneering of expert systems applications (for example Mycin (Ref. 2), Casnet (Ref. 3)). Nevertheless, strong reservations were made about the clinical usefulness of many of these systems, and few have become truly operational. "TEDEX" Thyroid Eye Disease Expert System is a modular ophthalmic expert system designed to work on a microcomputer. It can work as a stand-alone system. However it is designed to be interfaceable and integratable with other clinic systems such as the patient file data base, an ophthalmic charts reader, and a temporal visual assessment tester "TEMPRAC", thereby forming a prototype for a modular clinic automation system which can be used -without extravagancy - in the every day ophthalmic clinical environment. It may also open the road for future expansion to create other ophthalmic expert systems to constitute a comprehensive ophthalmic clinic automation system.

1.1 Thyroid Eye Disease and the Potential for an Expert System

Thyroid disease and consequently thyroid eye disease (T.E.D.) situation is complex since different parts of the human organism and its metabolism interact with each other on multiple levels and follow several feedback patterns. These interactions and feedback patterns become even more complex when the effects of other systemic conditions and the external environment are considered. These phenomena culminate in the following conditions:

1- The disorder is uncommon.
2- Its course is variable.
3- The outcome is unpredictable.
4- There is a large number of diagnostic and management parameters.
5- Management is uncertain.
6- Treatment is primarily empirical.

In addition to the above, the number of T.E.D. cases is small resulting in limited expertise among general ophthalmologists. There is therefore a major role for the design of an expert system to assist with diagnosis and management of this disorder.

In building TEDEX, our main source of data and expertise has been the 'Tennent Institute of Ophthalmology', Glasgow, where a large collection of patients with thyroid eye disease have been followed up for as long as 25 years. The expert system shell chosen to build our model is SAVOIR (Ref. 4, 5, 6).

2 TEDEX GENERAL DESCRIPTION

The objective of the design of TEDEX is to select the knowledge representation model along with a control strategy which closely mimics the ophthalmic clinician's consultation cycle in treating thyroid eye disease. The clinician already has a conceptual model of what he is doing, even though it may not be explicit. The selection of the knowledge representation model closest to the clinician's world lends itself to easier encoding of the knowledge. In addition, debugging and testing the expert system will not be so cumbersome with a knowledge representation model that naturally mimics the clinician's view point.

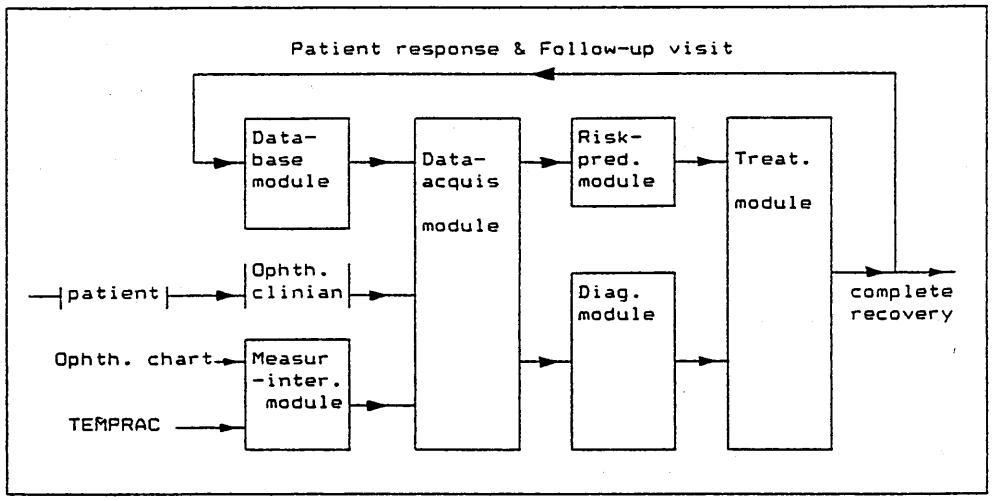

Fig. 1 TEDEX modules and diagnose-treat-response loop

2.1 The Clinician's Consultation Cycle

1 - At the patient's first visit, a new file is opened with a new hospital number. The clinician starts with direct interaction with the patient collecting (i) administrative and personal information about the patient, Eg name, age, sex,.. etc. ; and (ii) the clinical history.
2 - The clinician then examines the patient, looking for the symptoms and signs that enable him to make his diagnosis. He may carry out further investigations to add weight to his preliminary diagnosis.
3 - Having made his diagnosis, the clinician makes up his mind to devise necessary treatment or therapy, prescribes it and assigns the next visit appointment.
4 - A medical report is dictated, and the file is closed. The next patient is then called.

The above cycle is repeated with every patient. But when the patient comes for a follow-up visit there is some difference. Here, the cycle starts from step 2 . Some attention will also be directed towards observing any changes that happened since last visit.

2.2 TEDEX Cycle

To represent the above cycle, the model has been reduced into six modules, each of these represents one cluster of knowledge with distinct features. As shown in Figure 1, these modules, comprise the Data-base module, the Data-acquisition module, the Measurement-interpretation module, the Diagnosis module, the Risk-prediction module, and the Treatment module.

"Diagnosis" and "Treatment" modules are intelligent (data driven) modules. They are master modules. Other modules are mechanistic. They carry no intelligence, and are driven by the master modules when required. Since the nature of thought processes in diagnosis differs from the thought process for devising treatment, the two master modules have distinct

characteristics . In diagnosis the clinician starts with the answers (the symptoms) to abstract the reasons (the causes), but in treatment the clinician starts with the reasons (the causes) and searches for the answers (the treatment). The knowledge representation and the inference mechanism of each module is consequently different. The following are TEDEX corresponding cycle steps:

- TEDEX starts its session by enquiring about the user name and experience. The main menu then appears to enable TEDEX to know whether (i) the patient is new; (ii) the patient is coming for a follow-up visit; or (iii) a report about a patient is needed.
- The hospital number is the next thing to be inquired about.
- A new file is opened if the patient is new. Otherwise the patient file is retrieved for consultation or reporting. (Patients' file are stored in the Data-base module).
- The above steps are carried out by the Data-acquisition module through communication with either the Data-base module or directly with the user.
- The real work of the Diagnosis module then starts by examining the patient. Having made the diagnosis, a report appears informing the user about the findings and the recommended investigations.
- If these investigations are available, Measurement-interpretation module activates the chart reader. The appropriate chart is then scanned, recognised, processed, and transformed into an information vector. The vector is fed into the Data-acquisition module, then into the Diagnosis module. The same procedure may be followed for the TEMPRAC tester.
- The Treatment module is now activated. It has its inputs mainly from the Diagnosis module and the Risk-prediction module. Its outputs are partitioned into treatment and action.
- When treatment is made, a report is displayed or printed.
- The key information for this session is saved in the data base.
- Finally, an "EXIT" or "NEW SESSION" may be chosen when the main menu appears again.

3 TEDEX IN DETAIL

In this section, a brief description of the medical management of T.E.D. is presented. This description (Ref. 7) is to lay out a background for the sections that follow.

Patient evaluation: Evaluation of a patient with T.E.D. begins with a comprehensive general medical assessment of the patient. How severe a threat do the medical disorders pose to life and well being? Are there any contra-indications, or side effects of steroids, radiotherapy, or surgery? When the general medical status of the patient is known, the definition of the thyroid status is the next priority; namely either hyperthyroidism or hypothyrodism. What treatment has been directed towards the thyroid gland in the past? To what extent has it been successful? After the patient's general medical and thyroid status have been defined, the next step is to obtain a full history of the past therapy to the eyes, the success or lack of efficacy of that therapy, and the side effects resulting from it. Then attention can be turned to an assessment of the current eye status. How long is it since the first eye symptoms developed? Are the symptoms stable or progressive? What is the status of the cornea, optic nerve, eye lid, and extraocular muscles?

Patient_management: The above evaluation, allows the clinician to assess treatment options for the eye condition in the context of the patient's general health and against the record of previous treatment successes, failures, and side effects. A balanced assessment of relative risks from various forms of treatment is considered in the context of continuity of care and observations.

3.1 Data-base Module

The Data-base module is only a place for storing patients' files. Files are indexed according to patient hospital number. A patient file contains all the available information about the patient. A patient file is retrieved and saved by the Data-acquisition module.

3.2 Measurement-interpretation Module

This module is activated by the Data-acquisition module in order to get in return a qualitative description to either an ophthalmic chart or TEMPRAC tester. Ophthalmic charts and the TEMPRAC test are used by clinicians to obtain diagnostic bits of evidence.

TEMPRAC: is a test made to assess the time taken to achieve each level of Snellen acuity. It is employed as one of the clinical routine examinations. When Measurement-interpretation module invokes TEMPRAC, the test starts to run. When completed the test results are fed back to the Measurement-interpretation module in the form of an information vector.

Ophthalmic_charts: In ophthalmic practice, a wide range of charts are routinely used to diagnose and document various disorders of the human eye and visual processing. (Eg the field of vision chart, and the 100-Hue test chart). When the current module is activated, it invokes in due course an external programme that scans and reads the existing chart, extracts the desired diagnostic features, then encodes it to a summary feature vector and feeds it back to the invoker Measurement-interpretation module.

By receiving the fed back vector in either case, the Measurement-interpretation module converts it into a qualitative description, and then feeds it into the requesting Data-acquisition module.

3.3 Data-acquisition Module

Whenever data are required, this module is invoked by either the Diagnosis module, the Risk-prediction module, or the Treatment module, i.e. it interfaces TEDEX with the outside world. To perform this interfacing, the Data-acquisition module has to do the following: (i) acquire data from the human user, the data base files, TEMPRAC tester, or chart reader; (ii) check and validate inputed data before accepting it; and (iii) whenever accepted, convert acquired data to the form accepted by the invoker. The following is a brief description of its three interfaces:

Human_user_interface: The interaction with the human user (man/machine interface) occurs through direct questioning with the user. Figure 2 shows an example of a question a_i_disk_oedima (to ask about right eye disc nerve

```
PROBABILITY p1_disk_oedema 'to transfer the numeric
                           question to probability'
MEMBER (a_i_disk_oedema , 0.035 , 0.9 , 3.1 , 98 ,99)


QUESTION a_i_disk_oedema '

     #13#       Right Optic Disc
     #13#       On Ophthalmoscopy ?
     #13#
     #13#       (1)  No  diplopia.
     #13#       (2)  Suspected disk oedema.
     #13#       (3)  Definite disk oedema.    '

 INTEGER 1  3
```

Fig. 2 An example of TEDEX questions to get the right eye optic nerve condition, expressed in SAVOIR language.

condition, where 'a' stands for ask question, 'i' stands for integer, and 'disk' stands for optic nerve disc). The chosen integer answer is converted to an uncertainty probability variable p1_disk_oedima which is suitable to be fed into the Diagnosis module.

Data base interface: At the start of a session, the identified patient's file is retrieved and kept in the memory for interrogation when needed. At the end of the session, the file is updated and saved for follow-up and future reference.

Measurement interpretation interface: The Measurement-interpretation module is activated in order to get in return a qualitative description of an ophthalmic chart or of the results of the TEMPRAC tester as explained earlier.

3.4 Diagnosis Module

In order to make a diagnosis, the clinician is actually trying to draw out of a chunk of input information (symptoms) an abstracted description (conclusions) to the causes of disorder . So diagnosis is actually an abstraction thought process, and can be defined as: Identifying causes of given symptoms. Symptoms as well as disorder causes are of judgemental (uncertain) nature that depend to a great extent on the experience of the clinician. User experience proportionally strengthens TEDEX belief in the answer of some crucial judgemental questions. To cope with the uncertain nature of the diagnostic process, probability variables have been used in the knowledge tree representation of the Diagnosis module.

In TEDEX, symptoms are collected through direct personal questions, patient complaints, medical history, thorough examination, investigation, and are inputed from Data-acquisition module. Disorder causes (the goals of the present module) are the status or the condition of the following eye tissues: the cornea, the optic nerve, the eye lid and the extraocular muscles as well as the degree of proptosis . In TEDEX jargon, they are the malfunction probability of the eye tissue abbreviated as : p_mal_cornea, p_mal_nerve, p_mal_lid, p_proptosis, p_mal_muscles, p_mal_chemosis and p_mal_lid_oedima. These goals - when ready - are outputted to the Treatment module.

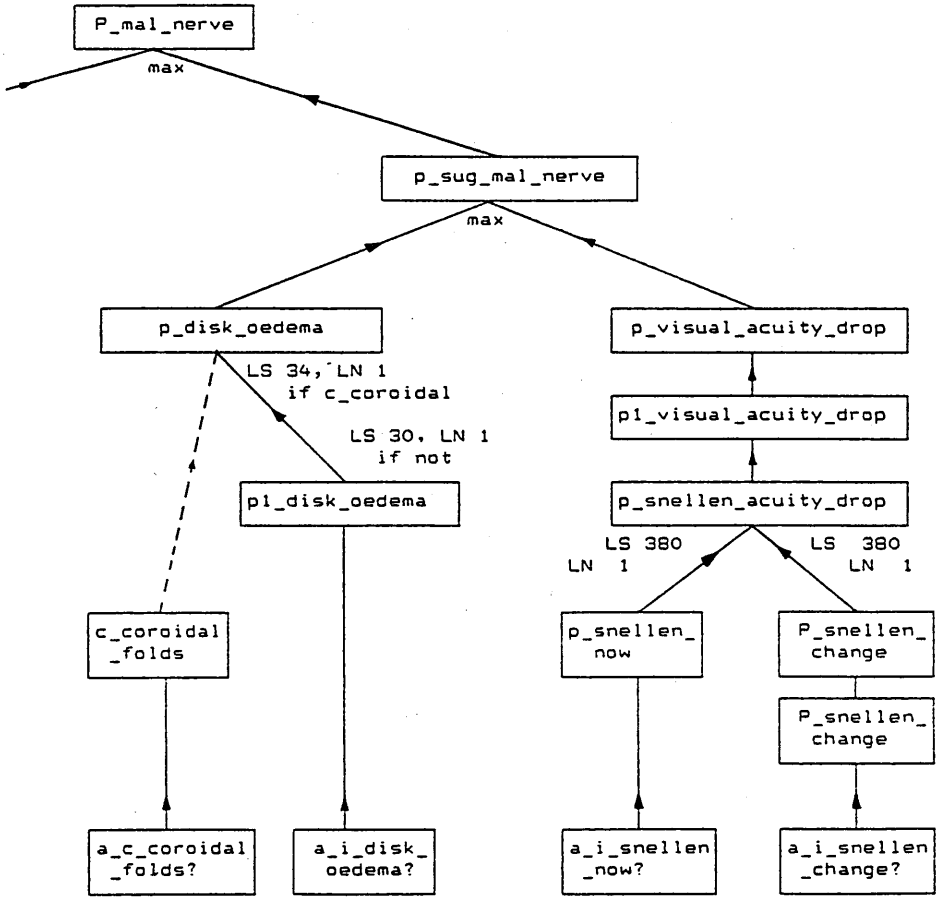

Fig. 3 Part of the knowledge tree representation to abstract the right optic nerve condition.

To represent the T.E.D. diagnosis model, the condition of each eye tissue is broken down into subconditions (at a lower level in the knowledge tree). The subconditions resulting are again broken down until no further subdivision is necessary (the lowest level). This lowest level, represents the symptoms collection level.

In Figure 3, an example is shown of how the condition of the optic nerve is abstracted, abbreviated as "p-mal-nerve" (the malfunction probability variable of the right eye nerve, where p stands for probability variable, and mal stands for malfunctioning). This variable is divided into two subvariables: (1) p_test_mal_nerve, the nerve malfunction probability assessed from investigations; and (2) p_sug_mal_nerve, the nerve malfunction probability assessed from the clinician's personal examination. Subvariable p_test_mal_nerve is again divided into (1) p_visual_acuity_drop; and (2) p_disk_oedima. Subvariable p_disk_oedima is further stepped down to be

pl_disk_oedima using Bayesian probability: LS 34 LN 1 if there are coroidal folds, and LS 30 LN 1 if there are no coroidal folds. pl_disk_oedima is the probability conversion of a direct question a_i_disk_oedima, explained earlier in the Data-acquisition module.

A similar representation is performed for p_mal_cornea, p_mal_lid, p_mal_proptosis, p_mal_muscles, p_mal_chemosis and p_mal_lid_oedima. The knowledge tree of each eye tissue is not segregated from other trees as it may appear from above description: they have some common metarules and leaves (the lowest level).

The above is the static representation of diagnostic thought process. To emulate the clinician while he is establishing his diagnosis, a "Forward" chaining control strategy has first been implemented. This is to keep the order followed by clinicians in examining patients. Having completed a patient examination, "Forward and backward" chaining takes over until the diagnostic reasoning is complete. The system generally starts by collecting symptoms (the knowledge tree leaves), then proceeds upwards to reach the abstracted disorder causes (the goals).

3.5 Risk-prediction Module

The function of this module is to infer likely consequent disorders, in the context of patient current ocular and general health conditions. It acquires its inputs from Data-acquisition module. Its output is fed to the Treatment module to help in devising the treatment.

The prediction process is mechanistic. Risk prediction factors are calculated by applying formulae which have been derived from discriminant function analysis of the series of patients studied in the Tennent Institute.

3.6 Treatment Module

The Treatment module output has 40 possible treatment items. It compromises two types: (i) treatment which stands for medicine, surgery, prisms or occlusion (32 out of 40 treatment items); and (ii) action which stands for assigning the next visit date. (8 out of 40 treatment items). The Treatment module input has (i) 13 inputs from the Diagnosis module; and (ii) 88 other possible inputs from the Risk-prediction module and Data-acquisition module.

After completing its job, the Diagnosis module, activates the Treatment module. In the meantime it feeds the Treatment module with the 13 probability variables that abstract current eye status. These probability variables are converted to integer variables (ranging from 1 to 4) so that:

probability	(<= 0.25)	becomes integer 1
probability	(> 0.25 to <= 0.50)	becomes integer 2
probability	(> 0.50 to <= 0.75)	becomes integer 3
probability	(> 0.75)	becomes integer 4

Only the proptosis variable ranges from 1 to 3. The combination of these integer variables creates a pattern that can be defined as 'snapshots' of the states which represent the eye status of this particular patient at this particular visit. The pattern in question can be expressed in the following

Table 1 Diagnostic pattern and its possible values.

diagnosis pattern form	< left eye (c, n, p, l, m, l, p, n, c) right eye >								
the corresponding possible values of each item	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3	3
	4	4		4	4	4		4	4

form: (c, n, p, l, m, l, p, n, c), as explained in Table 1. This nine-items pattern is the necessary minimum information that the Treatment module must start with. It may not be enough to reach the desired goals. In this case more information has to be collected about the patient from the "Data acquisition" or the "Risk prediction" modules using a "Backward and Forward chaining" control strategy.

Before proceeding any further, the treatment thought process will be analysed. After diagnosing the causes of the disorder, the clinician starts by devising a treatment therapy, and the goal in his mind is to effect partial or complete health improvement. Clinicians work on the premise that for the majority of diagnostic patterns, there is a treatment pattern (i.e. for each problem there is a solution). Knowing the diagnostic pattern, the clinician searches for the treatment pattern. The search is not a straightforward matter. It requires experience. The response of the patient to treatment proves how efficient or correct the treatment administered has been. Expert clinicians more commonly find and prescribe the correct effective treatment.

To emulate the expert clinician in planning and prescribing treatment, the Treatment module has been designed to be search intensive, and pattern directed. It deals with one or more disorder simultaneously while considering the whole amount of information about the patient . The Treatment module does not simply generate the treatment prescription; it analyzes and presents the best possible treatment with advice and recommendations. To emulate the search thought process, the Treatment module knowledge representation has been modeled in the shape of paths that transform the known diagnostic pattern into a treatment pattern. A path consists of production rules connected through predicate calculus relations. As an example, Figure 4 shows a typical treatment path searching for an item of the treatment pattern called 'c_tr_nerve_w_steroids', which stands for 'treat nerve with steroids', where c stands for condition variable, tr stands for treat, and w stand for 'with'. 'anti_steroids' is a condition variable which becomes true if the patient has side effects or contraindications to steroids (there is another path to get 'anti_ steroids' which is not shown here). 'n=4' is a diagnostic pattern item which means that the optic nerve is severely affected. Now 'a_i_treat_nerve', 'a_i_critical_choice' and 'a_c_your_choice_bad' are questions asked of the clinician to consult him about TEDEX choice in this treatment item. If he agrees, TEDEX continues working. But if not, an alternative treatment is tried. The reasons for considering the clinician's opinion are (i) this is an on-line decision support system; (ii) the suggested treatment may not be available; (iii) the clinician may personally prefer one treatment to

another, and (iv) TEDEX leaves action responsibility to the clinician. However for future reference both choices (TEDEX and clinician) are recorded.

The example just explained shows a path that deals with an optic nerve disorder, sketched in Figure 5 . Looking at the disorder pattern as a whole, we can generalize that diagnosis-treatment-response is a recursive cycle that stops when the patient is completely recovered. Risk prediction factors on the one hand, and patient responses to the prescribed treatment on the other, are the main factors that count in assigning the next visit date (abbreviated as "action" in TEDEX). In emergency cases, patients are kept under continuous observation.

Before leaving the Treatment module it is worth while stating that due to T.E.D. complexity mentioned in item 1.1 above, the mechanism of treatment function in Thyroid eye disease is different from the usual treatment function. In the usual treatment, the clinician is trying to bring about a partial or complete improvement in the patient's health. The purpose of the next visit is to see the effect of the treatment. In thyroid eye disease, this is not the case. Here, due to the marked variability of the disease course and to its self limiting nature, the eye clinician is not able to predict the possible outcome for the patient's eye. What he is trying to do is to observe the patient, and to prevent the outcome from irreparably damaging the eye, i.e. he is not directly dealing with the thyroid eye disease, he is dealing with its range of consequences. The goal in his mind is to avoid such damaging effects. The appointment for the next visit is arranged to observe the eye condition and to make sure that nothing urgent needs to be done. His role stops when both the thyroid disease and the thyroid eye disease become stable.

4 CONCLUSION

The present paper explains some features of TEDEX, the Thyroid Eye Disease Expert System, and highlights two main points.

The first is the emulation of the ophthalmic clinician's thought process in diagnosing and treating T.E.D.. It has been shown how the diagnosis can be considered as an abstraction thought process, whilst treatment is a search thought process. An example has been given to explain the relevant knowledge representation of each. The control strategy for each module has also been presented.

The second is the emulation of the clinical environment. This is to create a "clinic automation" system, where file saving or retrieval, reading and interpretation of ophthalmic charts, and encoding of temporal visual assessment are done automatically in such a way that it matches the work habits of the clinicians. This has been achieved by breaking TEDEX apart into six interfaceable modules, each of which is performing a well recognized clinical function. These modules are controlled by the intelligence of the "diagnosis" and "treatment" modules.

There is an important difference between TEDEX and other diagnostic expert systems. These systems emulate and help the clinician only in diagnosis and treatment of disease, whereas TEDEX emulates the general ophthalmic clinician in the whole consultation cycle. It helps him to do

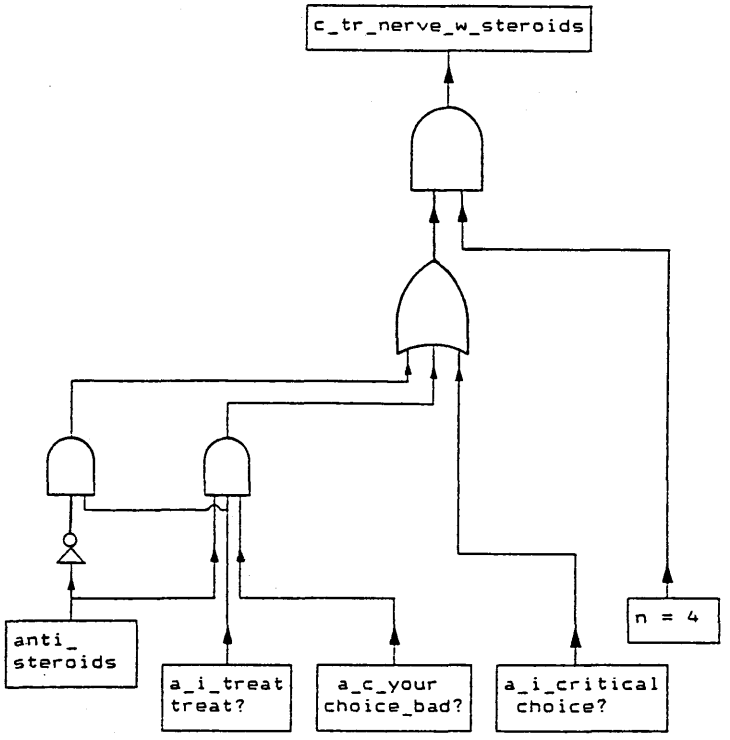

Fig. 4 The knowledge representation of a path searching for an optic nerve treatment pattern item.

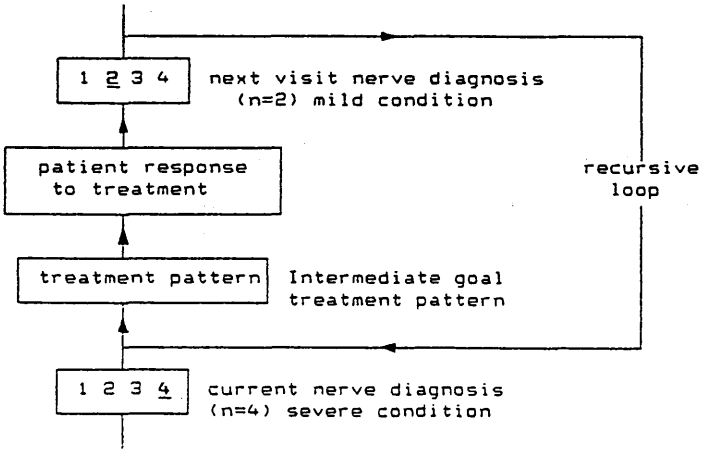

Fig. 5 Diagnosis-treatment-response recursive loop for the right eye optic nerve.

what he is used to do in a fast and accurate way. Moreover, it gives him the expert advice he requires. From the medical point of view , this system has many advantages: (i) the appropriate action is to be taken at the right time and (ii) specialised centres will deal only with the appropriately referred patients. From the financial point of view, these medical advantages will lead to increased savings.

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